FACTORY

MANAGEMENT AND MAINTENANCE

MAY 1946

McGRAW-HILL PUBLICATION

What Price Price-Control?

Let's Give the U.S.A. Back to the American People

PRODUCTION

Scale Model Speeds Kaiser-Frazer Conversion

Continuous-Flow Handling Lowers Unit Costs 40 Percent

MAINTENANCE

Orderly Storage of Spare Parts Cuts Production Delays

Flexible Compressed Air System Meets Layout Changes

LABOR MANAGEMENT

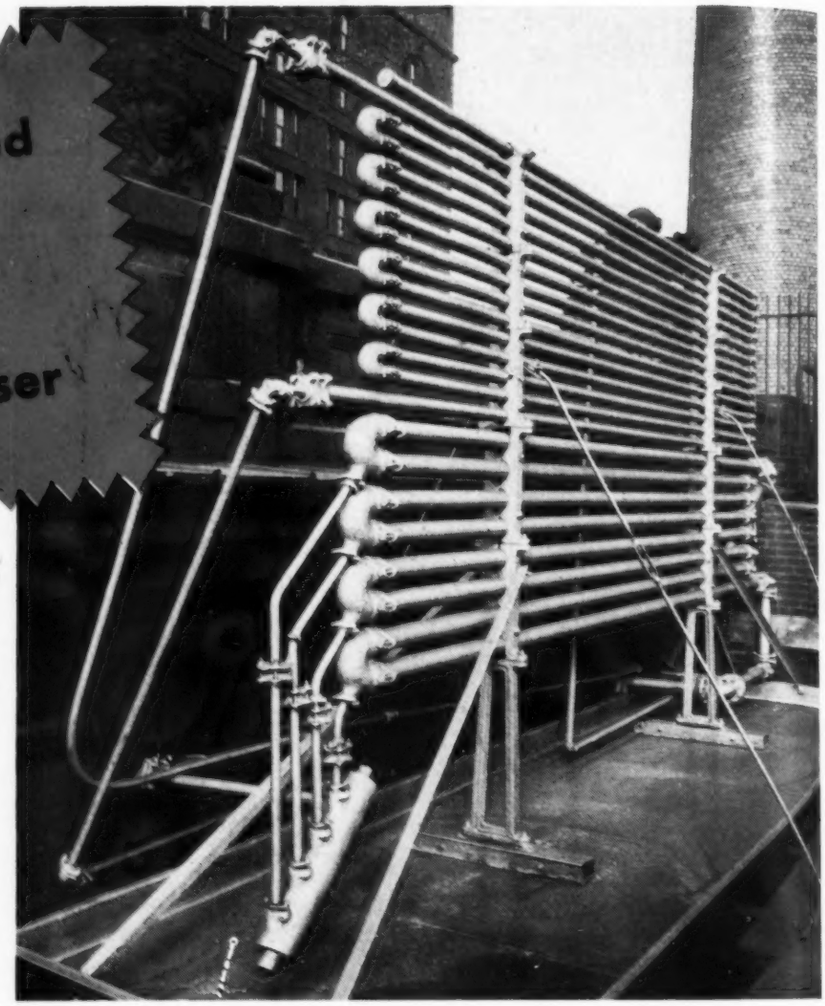
When Labor Strikes, Everybody Loses

Minnesota's Labor Law: Pattern for National Legislation?

FOR OTHER ARTICLES SEE THIRD PAGE

BYERS WROUGHT IRON

was appointed to succeed itself in this condenser



This combination horizontal atmospheric and bleeder-type condenser is located on the roof of a power plant in a large industrial city, and exposed to highly corrosive atmospheres. When the time came for retubing, the engineers didn't need an exhaustive study to select the right material, for the old tubing provided the best possible guide. It was wrought iron, and had served continuously for 20 years. Byers Wrought Iron Pipe was used for the job.

If any further evidence had been needed, two other stands located on the same roof would have provided it, for the wrought iron previously installed in them had lasted for 25 years.

Reports from users all over the country very definitely indicate that wrought iron can be expected to serve longer, at lower cost per year, in condenser services. An investigation of the histories of 32 condensers, 16 tubed with wrought iron and 16 tubed with ordinary materials, demonstrated this very dramatically. The minimum life of wrought iron was 14 years, and the maximum 35 years, with an average of 19. The minimum life of the low-first-cost material was 4 years, and the maximum less than 15, with an average of 8. Since only a short period of extra service is required to cancel out the extra cost of wrought iron, the savings are substantial.

There is a very definite reason why wrought iron serves so well in condenser service. It is found in the unique nature of the material. Tiny fibers of glass-like silicate slag are threaded through the body of high-purity iron. These fibers act like baffles, to halt and disperse corrosive attack, and so discourage the pitting that causes vulnerable materials to fail. In addition, the fibers help to anchor the initial protective film, which shields the underlying metal. Since no other metal duplicates the composition and structure of wrought iron, no other metal can duplicate the resultant properties of the material.

If you are contemplating the retubing of old condensers or the building of new ones, you will find some helpful information in our bulletin, "Wrought Iron in refrigeration and air conditioning systems." It is important to remember, also, that wrought iron is available now, in any quantity, for any project.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco, Atlanta.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE ALLOY STEELS · OPEN HEARTH ALLOY STEELS
CARBON STEEL TUBULAR PRODUCTS

HOUSING CAN COST TOO MUCH

EVERYONE in the United States wants our people, and particularly our war veterans, well housed quickly. Almost everyone, we believe, likes the vigor and imagination with which Wilson W. Wyatt, the housing expediter, is going about the job of mobilizing our housing resources.

No one, however, wants the veterans, or anyone else, to get a lot of severe economic headaches along with the housing. As it stands, the emergency housing program runs unnecessary risks of having such results.

Here are the reasons:

1. The principal opportunity the program offers to the veteran is that of buying a high-cost house where a chance to rent would, more often than not, meet his needs much better.

2. At the worst possible time, the program adds substantially to the dangers of a runaway inflation of the sort that inevitably ends in a crash.

3. Little is done to try to reduce the arbitrarily high costs of building, such as those resulting from restrictions imposed by labor unions and antiquated building codes.

4. By giving overriding priorities to unattainable goals of home construction, the program endangers a volume of industrial construction necessary to sustain full employment.

Needs of Veterans

First on the needs of the veterans. What many, if not most, veterans need is a chance to rent a place at a reasonable rental while they are getting shaken down in their postwar careers which in many cases are inevitably unsettled at this time. Essentially, what the "Veterans Emergency Housing Program" gives them is a chance to buy, for about $6,000, a house built along conventional lines and padded with much unnecessary labor and material cost.

But what are the alternatives? There are at least two. One is to put far more emphasis on more effective use of existing housing than the Wyatt program has thus far. The other is to see that the proportion of new rental units is much stepped up.

Incredible as it may seem, there are at present more than 2,000,000 vacant dwellings in the United States. Many of them should be demolished. But many permit of relatively satisfactory temporary use. Many more single dwellings can readily be converted into comfortable multiple dwellings. The emergency program assumes that only 350,000 dwelling units can be provided this year by these expedients, but it does not seem unreasonable to assume that this figure might be doubled by a vigorous drive. The result would be a better balanced emergency housing program, because it would provide more rental housing immediately and save critical building materials.

Of the new housing units contemplated by the Wyatt program, it is estimated that only about 20 per cent will be for rent. Before the war more than half of the homes in the United States were rented. That means that unless the Wyatt program is to create little less than a revolution in the terms on which homes are occupied, it must be revised to include a much higher proportion of rental units.

To secure the result in the face of present high building costs special inducements will be required. They might be provided by allowing accelerated tax amortization of, say, half the construction cost over the next five years, together with rent ceilings high enough to make this form of investment attractive. This would, of course, call for higher rents, but the actual price to the veteran, in woe as well as money, might well be much less in the long run than if he bought an over-priced house now.

Too Easy To Pay Too Much

One of the mysteries of the Wyatt program is its general emphasis on measures to increase the supply of money with which to buy houses when the demand for houses is already at an all-time high. Some veterans may need special financial help, but the plan to give 90-95 per cent mortgages generally on new homes is not only unnecessary but positively dangerous. By providing up to $3.5 billions of government-guaranteed credit for homes this year, and almost twice as much in 1947, the program will release an equivalent amount of individual savings to create further demand for goods and services. All that such generous mortgage terms will accomplish with certainty is a dangerous lengthening of the odds that we will not avoid a boom and bust cycle of inflation.

If building codes were brought up to date and arbitrary union working restrictions were eliminated, the way would be paved for reductions in the price of standard houses which, it has been estimated, might run as much as 20 per cent. This would both give the buyer of a new house a far better run for his money, and also reduce the inflationary pressure created by the super-generous credit arrangements involved.

Getting anything done along this line is difficult, particularly because the restrictions are imposed by tens of thousands of separate localities and organizations. Some headway is being made. The local emergency housing committees being set up under the Wyatt program provide a means of doing much more. Far more steam must be put behind this aspect of the program, however, if its greatest potentiality for permanently constructive accomplishment is to be realized.

Crippling Essential Industrial Production

The goals set for emergency housing construction —1,200,000 new homes started this year and 1,500,000 started in 1947—are higher than any qualified authority thinks can be met without crippling other essential construction. The reasons commonly assigned for such optimistic goals is that they are inspiring to those in the industry and soothing to those who want something tremendous done about housing.

Under normal circumstances, relatively little damage might be done by such excessive goals which are a common feature of most Washington programs trying to elbow their way to the center of the national stage. However, the emergency housing program carries with it top priorities for the materials to be used. Consequently, other essential construction will have to get along on whatever share of critical building materials will be left after all demands of home builders have been satisfied.

The Civilian Production Administration estimates that output of important materials will fall far short of needs. It forecasts a 15 per cent deficit in lumber, 18 per cent in bricks, and 52 per cent in cast iron radiators. Hence, unless building materials output can be stepped up far more rapidly than now seems possible, a prohibitive squeeze will be put on industrial building to provide the materials needed for the Wyatt program. This would complicate unbearably the problems of sustaining full employment and getting the flow of production so important in avoiding the boom and bust route.

Perspective on the Housing Shortage

What is needed is an aggressive drive to get full production of building materials as rapidly as possible. Such a drive should concentrate on measures aimed at helping the industry remove the obstacles to all-out production rather than on such measures as the subsidy plan which seems quite likely to succeed only in enmeshing the industry in more government controls. After making due allowance for the materials outlook and the needs for essential non-housing construction, housing goals should then be set as high as feasible. As matters stand, by setting construction goals before feasible material goals are determined, the cart is put before the horse.

There can be no doubt about the acuteness of the housing shortage and the necessity of a program commensurate with the magnitude of the problem. It also remains true, however, that the housing shortage for the nation as a whole is not quite as desperate as those who want the country to drop everything and go to building houses would have us believe.

During the war 3½ to 4 million new dwelling units were built or created by remodelling in other than farm areas. The number of families living in such areas increased by less than 3½ million. Even though some of this housing was located in remote places as an adjunct of war production works, the wartime increase permitted a margin for more housing per family at this time. Indeed, it has been estimated that the rate of doubling up is only about one-third as great as in 1940. The margin did not begin to suffice, however, to meet the needs of those millions of people particularly in the lower income groups who, thanks to rapid increases in income, can afford to have and insist upon having better housing than they have ever had before.

A rising standard of income which makes possible a new standard of housing for many people is a fine thing. Above all, it is important to see the veterans get the best possible break in housing.

But Housing Can Cost Too Much

The Wyatt program has many good features. The emphasis on prefabrication, though perhaps overoptimistic, is hopefully modern. The emphasis on local collaboration in solving housing problems which are inevitably in large part local should lead to permanently valuable results. The vigorous mobilizing of 300,000 temporary dwellings to meet at high speed some of the most desperate shortage is all to the good.

The main trouble with the program is that it does not pay enough attention to the economic havoc which may be created in the process of trying to meet its excessive goals. As a nation, we should be and are willing to pay a high price to get adequate housing. But the price will be too high if we:

1. Give the veteran a bad bargain by selling him an over-priced house.
2. Cripple industrial production needed to create good jobs for veterans, and
3. Touch off a disastrous inflationary sequence in the process.

These pitfalls can be avoided. All of us, including the veterans, have a common interest in seeing that they are avoided.

President, McGraw-Hill Publishing Co., Inc.

MANAGEMENT AND THE FACTORY

L. C. MORROW, EDITOR

INDUSTRY OUTLOOK BRIGHTER, IF—

The results of taking stock in this turbulent time of economic excesses are not so discouraging as the prospect of doing so would indicate.

First, the adverse factors:

1. The recent negotiations between management and labor have not constituted collective bargaining. They have, rather, represented attempts of labor to enforce collective demands with government support back of them.

2. The "bargaining table" has been in the White House, rather than in Detroit or Pittsburgh. Unions have not been willing to accept less than the highest office in the land has indicated as a justified increase.

3. The cards have been stacked against industry, politically if not deliberately, by the estimates of industry's ability to pay permitted to stand by the Department of Commerce, with all its statistical history behind it, until too late to have any but a boosting effect upon wage rates.

4. The wage-price squeeze, with bureaucratic dictation of terms and control of conditions, has meant low production and financial loss in many cases.

Now, the favorable factors:

1. A breathing spell is ahead in the campaign for higher wage rates. Union leaders know that the very money which supports their idleness must come from their own production. For the time being the backlog of savings of many workers is gone.

2. The Administration is learning that our economy is based upon production, and that eventually both wages and taxes must come therefrom.

3. The Secretary of Commerce has belatedly disowned the harmful ability-to-pay statement that emanated from his department.

4. Price-fixing by government has been largely discredited. There has been national recognition of the fact that wages and prices are related.

As I compare these adverse and favorable factors, opportunities look brighter than they have for some time. Fights involving industry were inevitable after the war—fights with labor, fights with government. Relatively, a period of calm exists. Coincidentally, more of industry's products are wanted now by more people than ever before.

Now industry can get further with the one job it takes most interest in doing: Making its products at lower and lower costs, so they can be sold at lower and lower prices, so that more and more will have to be made, and the standard of living of the country will go up and up.

However, if the coal strike continues and the railroad strike materializes, that can paralyze everything. Of course, it would seem that the government should take over both mines and railroads, and find ways of operating them effectively. But it might not, and in that case the outlook would be dark indeed.

L C Morrow

AT THIS CRITICAL PERIOD IN RECONVERSION WHEN A FEW "WRONG GUESSES" CAN MAKE THE DIFFERENCE BETWEEN ALL-OUT PROSPERITY OR ALL-OUT INFLATION, FACTORY'S

WHAT PRICE PRICE-CONTROL?

EDITORS BELIEVE THE ANSWER TO THIS QUESTON IS WORTH NOT $64, BUT MORE PROBABLY $64 BILLION, TO THE AMERICAN PEOPLE

Maybe we should have rounded up some mathematical physicists to answer this vital question: **"What Price Price-Control?"** Because if you hand a mathematical physicist a few simple facts like the height of your eyes from the ground, which direction you are looking, and at which tree, he can tell you how far it is through the forest to the tree.

But you will notice that the mathematical physicists carefully avoid getting tangled up in the forests of verbal conflict that surge around the economic results of OPA rulings. They're smart boys, these physicists; they stick to the simple things of life!

Not knowing any physicists who were willing to tackle such a tough question, we did the next most obvious thing. We asked a representative group of businessmen who manufacture and sell all kinds of goods how price control was affecting their operations. They *have* to have answers to such problems; if they act on the wrong answers, they lose their shirts (and so, it appears, does the public).

FACTORY's survey covers 264 plants, distributed among the following size groups: 100 employees or less, 32 percent; 101 to 500, 42 percent; 501 to 1000, 12 percent; more than 1000 employees, 14 percent.

Plants were distributed geographically in this way: New England, 15 percent; Middle Atlantic States (New York, New Jersey, Pennsylvania), 33 percent; East North Central States (Ohio, Indiana, Michigan, Illinois, Wisconsin), 37 percent; with 15 percent scattered throughout other sections.

Major products of the 264 plants ranged all the way from confectionery, food casings, and beer to lawn mowers, electrical appliances, and machine tools—divided as follows: Consumer goods, 12 percent; consumer durables, 24 percent; durable goods, 51 percent; unclassified, 7 percent.

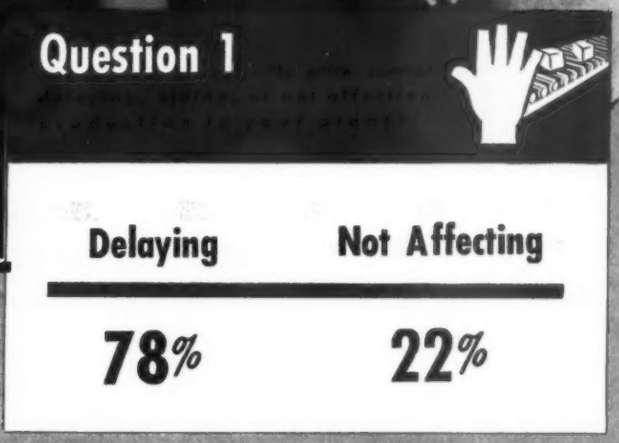
Our experience with sampling surveys, particularly "What the Factory Worker Really Thinks" *(Oct., Nov., 1944; Dec., 1945; Jan., 1946)*, convinces us that this survey truly represents the opinion of the manufacturing industry.

Question 1. *"Is price control delaying, aiding, or not affecting production in your plant?"*

You will notice (see top chart on facing page) that 78 percent said yes, price ceilings *are* holding up their production. This would mean they are doing so in almost four out of every five plants. Moreover, many of the replies that said ceilings were causing "no delay" came from companies whose own products are not subject to control, hence the restraining effect may be even more widespread. (The one rugged individualist who reported price ceilings to be aiding his produc-

Case study in price control. Benjamin H. Namm, president of the National Retail Dry Goods Association, shows a slip to Rep. Fred Hartley (R-N. J.) and Robert A. Seidel, vice-president of W. T. Grant Company. Made of voile crepe, by a newcomer, it's priced at $42 a dozen. Slip at left (shown in part only), also voile crepe, made by an old-line house, has a price ceiling of $15.75—less than its cost

Four out of five respondents say price controls delay production



tion is in the coal producing business. He says: "The union keeps our labor costs so high that abandoning price control would in my judgment create price confusion. Price-cutting would result, and our company would have to close down.")

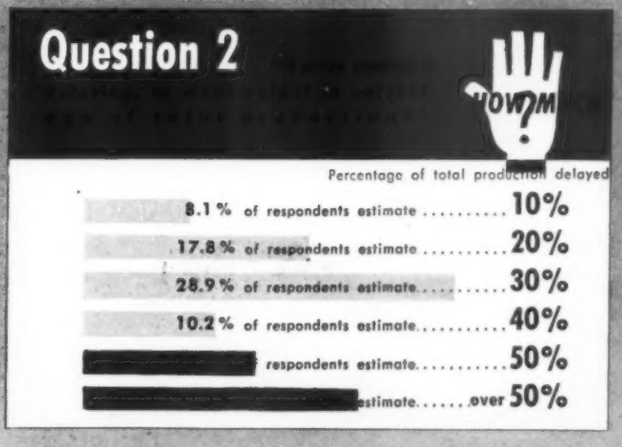
If price ceilings are delaying production in 78 percent of the companies answering our first question, the next obvious query is: "How much?"

Question 2. *"If delaying, to what extent in percentage of total production?"*

Notice (in bottom chart at the right) that the largest group (28.9 percent of respondents) reports a delay on 30 percent of its output while one plant out of three reports production delays on 50 percent or more. Most of these replies come from producers of *durable* goods. Since most of such products are themselves used in production of other goods, this is a compounded restriction in its influence on the economy as a whole.

It would be idle to multiply the averaged results of these answers into one grand generalization about how much total national production is being affected by price control. There are too many generalizations being hurled back and forth on this subject already. But real purposes can be served by in-

One out of three companies reports delays on 50 percent or more of output


Question 2
Percentage of total production delayed
8.1% of respondents estimate 10%
17.8% of respondents estimate 20%
28.9% of respondents estimate 30%
10.2% of respondents estimate 40%
respondents estimate 50%
estimate ..... over 50%

Five out of eight respondents have had to abandon low-priced items

Question 3

Yes	No
64%	36%

Nearly three out of five have shifted to higher priced items

Question 4

Yes	No
57%	43%

Nearly half of the respondents have had to abandon new items

Question 5

Yes	No
46%	54%

quiring *how* and *why* price control is delaying production in such a large percentage of companies.

In fact, the term, "delaying production," is a controversial one in itself. Stabilization Director Chester Bowles points to the fact that 52,000,000 people are currently employed; that the Federal Reserve index in December had reached the 1941 average. Therefore, he concludes, production was not being seriously hampered by price controls. All of which begs the question as to **what kind** of production are we getting and what kinds of goods are **missing** from the market? Not only FACTORY's questionnaire itself but also the letters that accompanied returns shed much light on this important question. Note, for example, the response to:

Question 3. "Have price ceilings forced you to curtail or abandon the manufacture of low-priced items?"

And to its corollary:

Question 4. "Have price ceilings forced you to shift the balance of your manufacture to higher-priced items?"

More than half—nearly three out of five—have shifted to higher-priced items.

Although the replies to Question 3 show that 64 percent have had to curtail or abandon low-priced items as compared with 36 percent that have not, many of the latter group report that they produce *only one line* of merchandise and therefore have no alternatives. Their only choice is to continue to produce, even at a loss, in order to maintain their competitive position. In fact, 46 percent of those replying on this phase of price control effects reported that they were **operating at a loss.** Since these replies were from a highly diverse cross-section of American industry, they throw a strange light on OPA's enthusiasm for stressing that *total* industry profits (before taxes) are at record levels.

Let's "look at the record" in terms of a few specific cases, to see how this whole situation is affecting the *kind* of goods consumers are getting and not getting. The entire textile industry is in a particular state of dislocation with respect to its low-priced lines, largely because of the MAP (maximum average price) regulations. Under MAP, **which was promulgated because the OPA itself recognized that unprofitable ceilings on low-priced goods were driving them off the market,** producers are in effect ordered to maintain their same proportion between production of high- and low-priced lines as prevailed in a prior "base" period.

Using MAP, producers have three choices: (1) To continue producing regular lines at a loss; (2) to produce their low-cost items up to the point where they are offset by profit on the limited quantity of higher-priced lines allowed; or (3) to stop producing altogether.

There is one other alternative (which is frequently recommended on the q.t. by harried OPA personnel as a way out of their own dilemma) and that is to think up a "new" product and ask for a special price ceiling. And that is precisely what is happening on a grand scale. It is the reason why there are no shirts available in the good old $1 to $2.50 price lines, but there are plenty of sleazy rayon shirts, shirts in bilious off-colors, shirts with "modernistic" pockets, shirts with collar tabs like a tired hound's ears, and other "new product"

shirts—all with legitimate OPA ceiling prices up to and beyond $10 per copy.

Or, if you need socks, you may be more interested in the experience of the largest work sock manufacturer in the country. His capacity is 60,000,000 pairs per year. When he had finished his war production stint, he expected to go back to turning out his old line of low-priced work socks—for which there is an acute need. But he found, after nine months of haggling, that his choice was old sock, old price, or else. The *or else* meant a loss because of increased cost on a low-margin item, and 60 million times any kind of loss is some loss. But don't worry about this producer. He's doing all right with 80 percent of his productive capacity in grease, while with the remaining 20 percent he is able to equal his old profit making a "new item"—a dress sock on which OPA willingly granted him a new and high price. Another sock manufacturer rolled the same stones out of his reconversion road by mixing a few off-color threads in the heel of his standard sock, thus making a "new item" out of it.

It is for the same reasons that a "new" shirt is on the market made from bed sheeting; new high-priced chenille robes are available at $3.25 up made out of low-grade "bedspread" chenille, while regular-quality robes are unavailable.

It looks bad for the bedding industry if other people are making wearing apparel out of its materials. But don't worry, at least one bedding manufacturer is using overall denim for a "new" mattress ticking because the overall manufacturers can't afford to make work garments out of it at their ceiling prices.

If, by chance, you have enough clothes, you may be more interested in how price control is affecting production in the housing field. A spokesman for the Western pine producers reports that a price squeeze of $2.40 per thousand board feet will cause the industry to fall short by a billion board feet of its goal of $4,500,000,000. This shortage is estimated to be the equivalent of 250,000 houses. Of course you could use bricks for your house, if it weren't for the fact that, as of the beginning of this year, 185 out of 750 brick plants were closed awaiting ceilings that would make it possible to operate at any profit.

You may encounter some additional construction problems arising out of the shortage of nails—another item whose production is badly bent by low ceilings. And you couldn't very well glue your house together because the casein glue producers are also stuck with an unprofitable ceiling.

But assuming you still can get a house built this year, you might have to use kerosene lamps in it for a while. The people who manufacture brass sockets for lamps can't operate under current ceilings without loss, and production is virtually stymied. BX cable connections are out of circulation except in the black market.

The entire electrical merchandise field is one of the most badly disorganized because of price ceilings, since most electrical appliances have so many *parts*. Even where the finished product manufacturer (as in the case of radios) might be able to "absorb" his own cost increases, the small increases on a few small but vital parts (or their complete absence because their makers are also up against unprofitable ceilings) has the "huge backed-up demand" for radios still "backed up," waiting for production.

The story is slightly different in the field of less complex electrical items where "new" manufacturers can get going quickly with a special price ceiling. Thus a Providence tool manufacturer can get one-sixth horsepower motors of a cat-and-dog brand for $28.88, but he can't get the ones he's always used at their price ceiling of $6.28.

A toy manufacturer used to make rough-tough pre-war coaster wagons to sell for $6.95. He can't make them for that price now, yet it's still his ceiling. But a "new" manufacturer has a wagon—and a ceiling for it of $17.95—and even a top-echelon OPA official admitted the new wagon "wouldn't last a 10-year-old very long."

As for canned tomatoes, you'd better plant another post-victory garden. The ceiling (plus subsidy) on No. 2 cans is $1.10 per dozen; the average cost $1.26½. Last year a Southern canning association packed 53,359 cases. Its members could have canned more than a million cases from their crop, but they had to make other tomato products with a lesser squeeze on their ceilings.

Consider, for example, a small group of companies that make power transmission equipment—clutches, couplings, universal joints, etc. Two of these companies, each of which has been operating for more than half a century, have completely abandoned their entire lines of products because of their price ceilings, which have remained unchanged in spite of repeated requests for relief. These two companies offered their patterns, tools, good will, and all to any competitors who would take them. There were no takers—because the price ceilings go right along with the products.

Unfortunately, this is not simply a matter of two small companies having withdrawn from the supply picture. The more serious aspect is that all the varied machinery of other companies using these vital power transmission parts now have no source of repair parts or service, except on a "custom" basis. Moreover, none of the remaining manufacturers of similar power transmission products will even guarantee to replace or service its own products for any given length of time in the future. They are all too near the point of abandoning their lines just as their competitors have done.

This situation throws light on another question asked of those companies that reported they were operating at a loss —namely, **how long can you continue to keep this up?**

The replies of those in this category ran all the way from "can't last any longer" (4 percent) to "3 years" (1 percent). Other replies: Not long (6 percent), few months (1 percent), 1 or 2 months (4 percent), 3 months (13 percent), 4-6 months (16 percent), 1 year (17 percent), don't know (30 percent), miscellaneous (8 percent).

Now suppose we shift the point of view of our analysis. While it is clear that many a company is weighing the critical question of how much longer to hang on, a great many more companies are debating when and how much they could *expand* in a *free market*. Obviously, this factor of potential expansion of production is a key consideration in the current price control issue. It is the uncandled egg which OPA says won't hatch at all if it isn't kept warm by OPA's sitting tight; and which NAM says would hatch immediately, under the warm sun of competition, into a golden gosling of prosperity if the OPA would get its cold proboscis out of the nest.

In an effort to penetrate the cloud of feathers flying about this issue, FACTORY included in its survey:

Question 5. "Has price control forced you to abandon the manufacture of new items you had planned to bring out?"

Almost half the replies were in the affirmative.

In order to pursue this part of the analysis, those plants

indicating that price control had delayed their new product plans were asked:

Question 6. "Had you been able to bring out these new lines, to what extent would they have increased production in percentage of present total output?"

Seven out of eight replies fell in the "20 percent and up" range.

No attempts were made to weight the replies from this small sample sufficiently to make any national estimates of production delays. Nevertheless, when 46 percent of the respondent companies, whose products run virtually the entire gamut of producer and consumer goods, report price-caused delays in bringing out new goods; and when the estimated delays exceed 20 percent of total production in the main, the conclusion seems inescapable that **price control is seriously delaying production.**

If these delays were exclusively confined to new kinds of products we had not had before, and therefore theoretically can continue to do without, it might not be so bad. But unfortunately price control factors are not only delaying these new products (whose purchase would help to siphon off accumulated purchasing power which is inflationary and against which price ceilings are supposed to be a bulwark), but they are also causing companies to abandon old-line products where the price squeeze has made them unprofitable.

It is a moot question which of these situations causes the greatest delay to the total expansion of production during the critical period of reconversion. But it is neither debatable nor incidental that the delay, either in new production or in the resumption of old lines of merchandise, causes compounded delays which extend far beyond their effects on the specific company involved.

Thus it may be that no employee will lose his job because a company decides to give up making unprofitable castings for mill machinery parts and decides to produce some *ersatz* new gadget on which it can get a high price ceiling. The real pay-off question is: **"What do all of this company's former mill customers do until they find a new source of parts?"** (And usually, if one supplier finds his price situation impossible, most of the others in the same field are similarly affected.)

In an attempt to obtain some perspective on this intercompany influence of price control on production, FACTORY's questionnaire also included the following:

Question 7. "If there is a lack of full production in your plant because of price controls, is it causing production bottlenecks in other plants that buy your products?"

The response was nearly 6 *yeses* to 1 *no*.

Similarly, when FACTORY asked:

Question 8. "Do you believe that price controls are causing bottlenecks in your plant because of a scarcity of items you want to buy?"

The answer was again heavily in the affirmative. Six out of seven respondents said "Yes."

The answers to these two latter questions re-emphasize the interdependence of companies, irrespective of their products, as integral parts of the great single web of American enterprise. It also explains why many companies whose own products are not controlled, or have been released from control, are still curtailed in their plans for production expansion by controls on component parts. Possibly the situation is all the more dramatized because plant executives already have frayed nerves after four war years of hunting subcontractors and sub-subsuppliers of components for their war products, only to find, after finally getting back into civilian production, that their old standby suppliers are either unable to deliver their parts at acceptable prices, or have stopped producing them.

A New England screw manufacturer, for example, has eliminated manufacture of all small-sized screws and bolts because only the larger sizes can be produced on a break-even basis under his ceilings. Moreover, he can't guarantee quality on those he does produce because he can get only green lumber for boxes and the moisture from the wood tends to rust some of the contents.

Similar situations are reported from elsewhere in New England where producers tend to specialize in precision products requiring high labor content and with narrow margins of profit. Thus a tool manufacturer reports waiting six weeks for bed castings ordered from a pre-war supplier. Finally the foundry reported inability to deliver at the old price and no prospect of relief. It suggested that the manufacturer order the same castings from a new source which would make it as a "new" product at a new ceiling. Estimates on such "new" products ranged 200 to 300 percent higher. Meanwhile eight more weeks had elapsed, during which time the tool manufacturer had lost some of his best skilled labor to "steadier" jobs. Finally, he canceled his commitments to deliver his old line of castings and has himself gone into the production of other goods which are "new" to him and more expensive to whoever uses them.

Still another New England manufacturer has dropped 33 items from his catalog of 200. One of the discontinued items was a cable connector. With this supply cut off, one of his customers, who manufactures refrigerating units, has 600 units in storage until he can find a new source of this one small item worth 3.2 cents each at pre-war prices. (He did find a handful of these precious connectors which a jobber had locked in his desk drawer, whereas normally they are stored by the binful.)

When Henry Ford II reported it cost his company $1041.26 to manufacture a car to sell for an OPA ceiling of $728, he made nationwide headlines—the more so because the Ford company is going ahead at such a loss on the gamble that, before it is too late, it can close the gap through the efficiencies and economies of mass production. But it is the small operator, with no cushion of size or other factor of maneuverability to draw on when his system of supply, manufacture, or distribution is upset, who is hardest hit by these sudden and unnatural gyrations growing out of price dislocation. Even a change in the cost or availability of shipping containers may severely rock or sink his small boat. And just such things have happened.

Consider, for example, the case of southern rotary-cut veneer. The "MPR" situation is as follows:

MPR #538.....#2 core stock....$128 per MBF
MPR #195.....egg-case stock....$ 84 per MPF
MPR #176.....box-grade stock....$ 74 per MPF

Three respective sheets of these veneers placed side by side are virtually indistinguishable. Any mill making box-grade

stock can produce the other grades at practically the same cost. Yet OPA decreed that these widely varying ceilings shall be determined solely by *end use* of the veneer; also that *any* veneer used for boxes shall sell at the MPR #176 price.

Question: Who gets available supplies of veneer and at what price?

Meanwhile a variety of products ranging from foodstuffs to heavy manufactured goods, requiring wire-bound box containers made of such plywood, are curtailed by manufacturers or are stored awaiting shipment. Also, other users of cheaper-grade plywood, such as builders who use it for concrete forms, get along with makeshifts or more expensive substitutes.

In view of the fact that by its own admission OPA has been potentially concerned with prices on 8,000,000 different products, there is ample reason for error and inaccuracy. All of which puts a premium on the question of how these errors and inaccuracies can be corrected. It is this "waiting for relief" which is one of the largest burrs under the blanket of price ceilings.

Question 9. *"Have you received prompt action from OPA on requests for price relief?"*

Only one out of eight companies reported "prompt action."

Question 10. *"If not, how long have you been delayed?"*

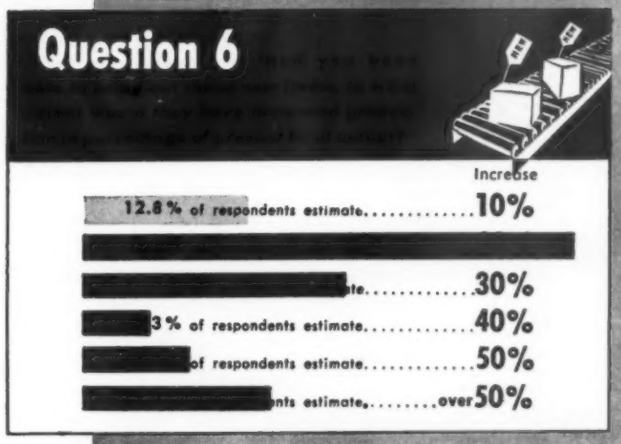
More than half of the respondents said "more than 4 months."

Many responding companies detailed their case histories of relations with OPA covering periods as long as three years. Among such replies the following, from a door knob manufacturer, is both cryptic and fairly typical:

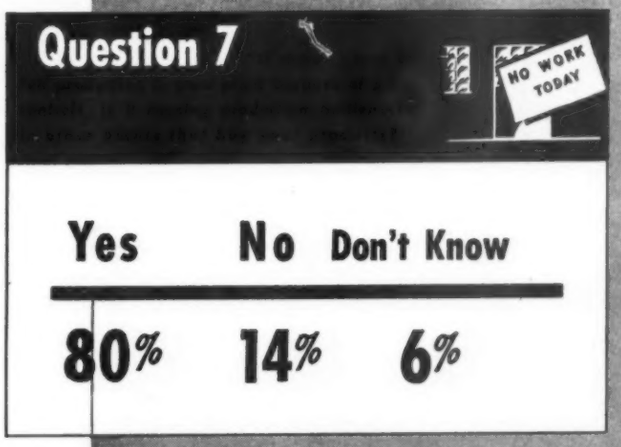
May 20, 1945: **Company asked local OPA what to do about prices.**
May 21: **Mailed forms and exhibits to Washington OPA.**
July 9: **Asked local OPA if there had been action.**
July 11: **Washington OPA wired: "Unable to determine jurisdiction."**
July 31: **Washington asked for photographs.**
September 3: **Wired Washington OPA: "Production stopped, workers laid off."**
September 7: **Washington OPA wired "Expect decision next week."**
September 13: **Washington phoned: "Send samples."**
September 14: **Samples sent to Washington OPA.**
September 20: **Wired Washington OPA: "Can we do anything to expedite?"**
September 28: **Local OPA advised: "Keep pressing Washington."**
October 1: **Local OPA asked: "Has Washington acted?"**
October 3: **Local OPA announced Washington has reached decision. The decision: A price exactly covering cost of materials and plating, no more; about half of competitor's prices.**
October 12: **Washington OPA denied appeal for relief.**

In order to check *recent* experience under OPA in contrast to the war period, respondents were asked whether they had noticed any improvement in relations of late. Forty-four percent said "yes"; 56 percent said "no." Thirty-five percent said they were at least getting more prompt replies,

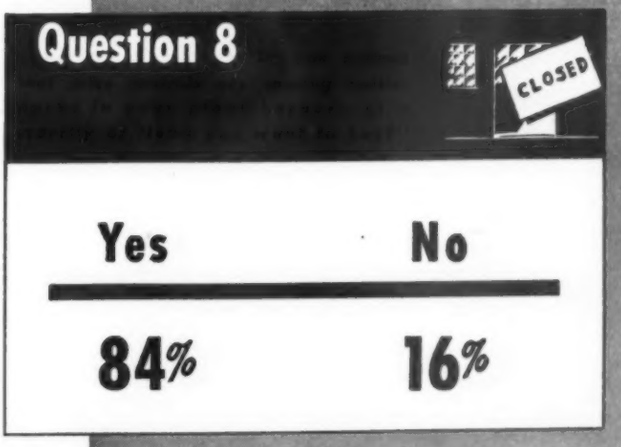
Seven out of eight estimate output losses at 20 percent or more



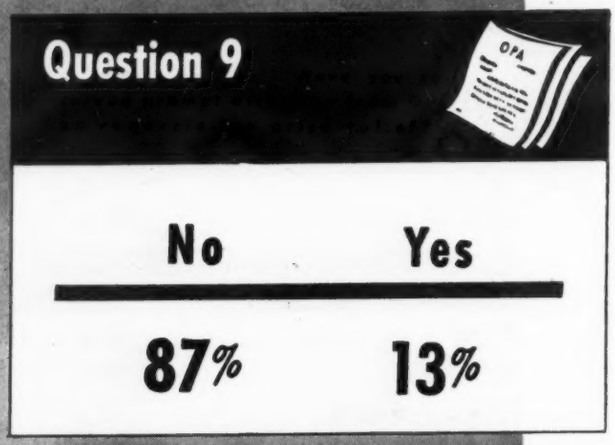
Four out of five report bottlenecks caused in other plants



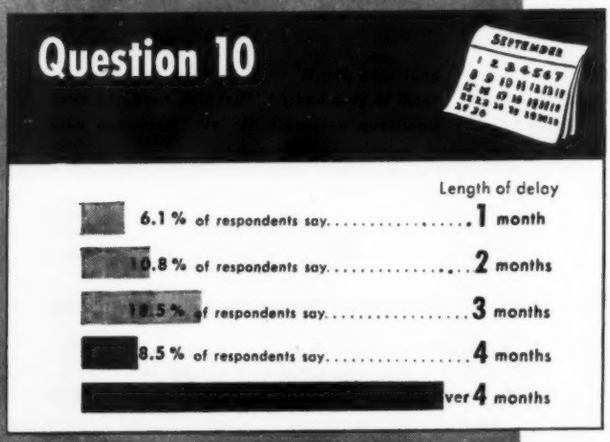
Five out of six report bottlenecks in their own plants



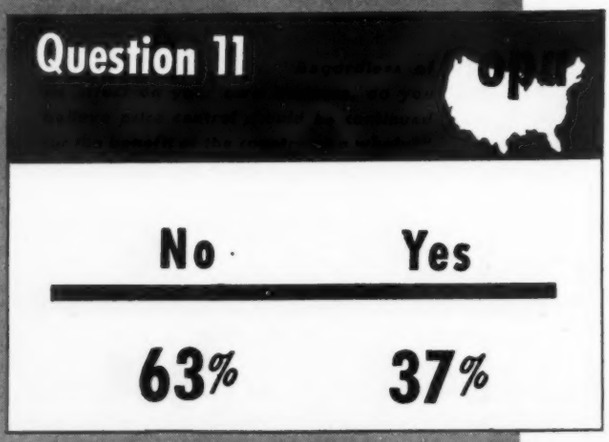
Seven out of eight companies report slow action from OPA



Five out of eight report delays of four months or even longer


Question 10
SEPTEMBER
Length of delay
6.1 % of respondents say..... 1 month
10.8 % of respondents say..... 2 months
18.5 % of respondents say..... 3 months
8.5 % of respondents say..... 4 months
over 4 months

Five out of eight believe price control is bad for the country



but 66 percent reported that it still took as long as ever. Only one plant out of fifteen would say that OPA procedures are "now generally satisfactory."

When asked the summary question:

Question 11. *"Regardless of its effect on your own business, do you believe price control should be continued for the benefit of the country as a whole?"*

Five out of eight respondents said "No."

Among those who felt it should be continued, only 6 percent said for as long as 18 months; other replies were: 2 months (6 percent), 6 months (40 percent), 9 months (17 percent), 12 months (31 percent).

If anyone, in the government or out, had a crystal ball that would answer the questions below, then most other questions concerning OPA would become largely academic:

"If price control were abandoned

(a) How much production increase above present expectancy do you think you would get over the next 12 months?

(b) How much do you think the price of your goods would increase before competition would stop increases?"

No attempt was made to "force" the answers to these two questions into any suggested ranges. Each respondent made up his own figure or range.

As for predicted production increases if price ceilings were removed, only 6 percent of the respondents felt that they would have "none." On the other hand, more than 86 percent **believed their production would increase by 20 percent or more.**

The critic can readily say that these replies are only "guesses" about what "might" happen. Yet, virtually all business decisions are made on best guesses about the future; and if all producers in the nation increased their production only *half* as much as those samples expect to if price control were dropped, the result would be at least $15,000,000,000 of additional goods during the year ahead.

But important as such an increase would be to a nation concerned about inflation, the removal of price control might have a secondary effect of greater value—namely, the restoring of "rationality" to our productive economy. Then foundries could go back to casting specialty tools instead of making "new" and not necessarily needed gadgets; fabricators could get all sizes of nuts, bolts, and screws—not just the profitable big sizes; goods could be sold over the counter at competitive prices instead of under it; white shirts would come out of the black market; and salesmen could begin traveling around the country instead of vice-presidents commuting to and from Washington.

WOULD PRICES INCREASE?

How much would all this cost in increased prices? Forty-five percent of those who answered FACTORY's questionnaire believe the increase would not exceed 10 percent before competition headed it off; only 6 percent feared or expected it might exceed 25 percent with respect to their own products.

As might have been expected, the replies from operators in highly competitive lines expected their prices would increase the least. Thus it is that an automobile manufacturer expressed his belief that no competitor in his field would *dare* to raise his prices more than 3 percent above those

Bowles Profit Formula Is Not What It Appears to Be

1936-39			1946				
Net Worth	Profit Before Taxes—9.9% of Net Worth	Profit After Taxes—8.2% of Net Worth	Net Worth	Profit Before Taxes—9.9% of Net Worth	Profit After Taxes—6.1% of Net Worth	Profit After Taxes to Equal 1936-39—8.2%	Profit Before Taxes to Equal 1936-39—13.22%
50,000	4,950	4,100	66,667	6,600	4,067	5,467	8,813
100,000	9,900	8,200	133,333	13,200	8,133	10,933	17,627
250,000	24,750	20,500	333,333	33,000	20,333	27,333	44,067
500,000	49,500	41,000	666,667	66,000	40,667	54,667	88,133
1,000,000	99,000	82,000	1,333,333	132,000	81,333	109,333	176,267
2,500,000	247,500	205,000	3,333,333	330,000	203,333	273,333	440,667
5,000,000	495,000	410,000	6,666,667	660,000	406,667	546,667	881,333
10,000,000	990,000	820,000	13,333,333	1,320,000	813,333	1,093,333	1,762,667
100,000,000	9,990,000	8,200,000	133,333,333	13,200,000	8,133,333	10,933,333	17,626,667

Based on net worth, the Bowles formula for corporation profits allows the same rate of profit after taxes as averaged in the four years 1936-1939. For a sample of 2152 manufacturing corporations that rate was 9.9 percent. After the corporation tax of 17 percent was deducted, the remainder equaled 8.2 percent.

On the average, net worth of manufacturing corporations now is one-third more than the 1936-39 average. Corporate income tax is 38 percent. A 9.9 percent profit before taxes now equals only a 6.1 percent profit on net worth after taxes. To provide a profit of 8.2 percent on net worth (the 1936-39 figure), profit before taxes should be 13.22 percent.

The table shows the application of the 1936-39 percentage averages to corporations of varying net worth and specifies the profit before taxes necessary to give the same percentage return as in 1936-39. However, the lesser value of the dollar today has been disregarded.

already established, even in a buyers' market such as currently exists. This man's belief is based on nearly 25 years' experience with automotive competition.

The inherent difficulty with all such beliefs, and indeed with all such surveys of opinion, is, unfortunately, that the only way to *prove* the results is to put the issue to test. In this case the proof would be to end or suspend all or most price controls for at least a temporary period. Congress is making up its mind on this thorny question as this issue of FACTORY goes to press.

SUMMING UP THE HANDICAPS

Having carefully examined the tabulated results of their survey, the editors believe firmly that their main question—**"Is price control holding up production?"**—is answered strongly in the affirmative.

Taking the experience of one company after another, it appears not only that ceilings have held up production of their normal products for which uses and needs have already been established in the economy, but by indirection these same controls are encouraging production of other nondescript but profitable goods, sale of which can only add to the average cost of living and to the cost of price control.

It would also appear that the claim of "holding the line" on prices is among the poorest defenses of ceilings. Holding the *legal* ceiling price down achieves nothing if (1) production is thereby curtailed at a loss to producers and (2) the bulk of such production as continues is sold far above the legal ceiling. Meat is currently the classic example of this type of kink in our normal distribution system. Our animal population is at an all-time high; feedstuffs are short by reason of the needs of starving humans elsewhere in the world; our own people have more money to buy meat than ever before; yet some of Chicago's world-famed stockyards actually have grass growing in them, while animals are slaughtered under trees and in barns and garages.

Authorities estimate the black market cost of such abnormalities may run to $2,000,000,000 in the course of a year. Such black market costs would allow for quite a rise in the *legal* prices of goods before they would exceed the current actual prices at which these same goods are changing hands.

Finally, it would appear from the fact and opinion turned up by FACTORY's survey, that one of the chief handicaps of price control is the government's attempt to use this one pill to cure all manner of economic ailments, without so much as prescribing the pills in different colors or strengths. As a result many of the patients are getting so sick of the medicine as to raise doubts about the qualifications of the doctors. They cannot escape the feeling that a really good medico would show some interest in the swollen condition of *wage rates* compounded by poor circulation in the veins of *labor efficiency* and the arteries of *plant productivity*. Nor can they escape the impression that a continued fever of *government spending* isn't too good for a patient who is also suffering from chilblains in the *tax* extremities and badly in need of a better *fiscal* prescription. Above all, they are sick and tired of standing in line at the OPA clinic with their tongues hanging out while some interne tests to see if there isn't still a slight coating of *profit*.

LET'S GIVE THE U. S. A. BACK TO THE AMERICAN PEOPLE

EUGENE E. WILSON • VICE-CHAIRMAN, UNITED AIRCRAFT CORPORATION, NEW YORK

The time has come, says Eugene Wilson, for us manufacturers . . . to get out in the field and sell our ideals and our enterprises . . . We who understand the American way, who have confidence in it and know how to make it work, should rediscover its dynamic, constructive character and sell it back to the people

To Mr. John Q. Public, innocent spectator of the current championship labor-management bout (with government the not-disinterested third man in the ring), the sorry spectacle isn't worth the price of admission. "What do these punks think they are trying to do?" he asks. "Why aren't they back on the production line?"

This is a critical situation. Even if management wins the bout, it already has another black eye. It has reached a new low in public esteem, just as a lot of reactionary ideas are abroad. The old order changeth its name to the "New Order"; oriental despotism and decadent socialism stalk abroad seeking to subvert western liberty; the virus of statism penetrates the blood of many good people. These people are confused. They need leadership. Management could give it. Management must give it.

The management executive doesn't like this labor-management brawl either. He hopes it will some day blow over and let him go back to making goods and money, but he knows in his heart it is getting no better fast. He knows it doesn't thrive in adverse public opinion, but public opinion is too abstract for him to understand and too intangible for him to do anything about. So he hires a man or an agency to take over "public relations" and washes his hands of it.

That isn't the thing to do. The stakes are too high. Remember the First World War? We think that production-wise manufacturers did a remarkable job considering the fact that they were only in the war 18 months and started out completely unprepared. But what does the public think? Only what it has been told. It recalls that someone promised to "darken the skies with clouds of airplanes" and industry failed to meet its own schedules. It thinks "they" squandered $640,000,000 of its money in the process. Thus industry stands condemned by its own words and acts. Public relations-wise there wasn't much to brag about.

LOOSE TALK ABOUT PROFITS

And how about war profits? We know there was a lot of loose talk about big profits in that war, but when the contracts had been brutally terminated many industries went through the wringer and lost their shirts. We know that 60-odd representative companies with an apparent net worth of $2,500,000,000 had to write it down to $1,250,000,000. But what does the public think? It still thinks industry came out of the war wearing the zoot suit of a profiteer.

And so Mr. Uno Who gave identical connotations to the words "profit" and "profiteer." We know that profit is the great regulator and controller of costs and, therefore, the balance wheel of our system. But to many honest citizens both "profit" and "profiteer" smelled bad. That didn't prevent them from striving for more take-home for less production, but it made a "munitions racketeer" out of the boss.

Before the Second World War public reaction against "profiteering" forced Congress to single out the shipbuilders and aircraft manufacturers—two vital defense industries, for discriminatory statutory profit limitation. It produced the Arms Embargo Act—that invitation to Hitler to attack France and Britain. Save for the amazing resilience and resourcefulness of our private manufacturing establishments these acts could easily have lost us the war.

I believe that if American management had recognized its peril in the Second World War and had volunteered to police itself profit-wise in the public interest, things would have been different today. The war tax could have had the nature of an excise tax. It need never have been labeled "Excess Profits Tax." I am convinced that had government leadership recognized the peril and asked business to cooperate, the Price Adjustment Act could have been designed as a check instead of a police act passed in a punitive spirit. Actually, necessary war taxes took on the evil connotation of an assault on the profit motive and renegotiation had the implication of gathering in those excessive profits it missed.

To illustrate what I mean by policing ourselves profit-wise, I cite the case of my own company. Beginning a year before the Price Adjustment Act was passed, we stabilized earnings at pre-emergency level and began voluntarily reducing invoice prices on fixed-price government contracts, thereby avoiding any necessity to relinquish profits on renegotiation. We adhered to this policy and, as sales went up over fifteenfold, held net profits at a constant level. In our annual report dated December 31, 1941, we included the following statement of corporate principles:

"We dedicate ourselves to the great task of producing the goods and rendering the services required by the war effort at the maximum rate and the lowest cost consistent with the required quality.

"In the execution of the foregoing, we pledge ourselves:

"1. To limit profit to that necessary to maintain the business in the sound financial position required to execute the task.

One of the country's most articulate spokesman on modern concepts of air power, Eugene E. Wilson is an outstanding leader in industry. A graduate of the U. S. Naval Academy, he resigned as a Commander, after 25 years' service, in 1930 to become president of Hamilton Standard Propellors Corporation. From 1931 to 1943 he served, successively, as president of Sikorsky Corporation, Chance Vought Corporation, and United Aircraft. He is a noted sportsman, was captain of the U. S. Rifle team that won an international competition in Italy in 1921. Wilson is also chairman of the board of governors of the Aircraft Industries Association and author of "Air Power For Peace," published in 1945 by McGraw-Hill Book Company

MY CODE OF BUSINESS ETHICS

We employers solemnly undertake to manage the enterprise for which we are responsible, with due regard to our public and private responsibilities, along lines calculated to make it unqualifiedly attractive and profitable for every employee, customer, and shareholder to:

1. COOPERATE 2. WORK 3. INVENT 4. CREATE 5. INVEST

to the end that he or she may gain his or her security with "ceiling unlimited"

E. E. Wilson

"2. To stimulate output and reduce costs by rewarding individual initiative and performance with adequate compensation, and to provide the best possible working conditions.

"3. To take all measures consistent with accomplishment of the task to the end that after the war we can help restore peace and stability in the shortest possible time."

Now with the war over we still feel the impact of the Excess Profits Tax mistake on public opinion. The eminently fair carryback provisions were designed to help provide jobs. But today powerful labor leaders headline them as examples of corporate greed and accuse industry of trying to shift the cost of strikes onto Uncle Sam's shoulders! Government asked for the strikes and labor accommodated it. Management says nothing.

Suppose, now, that all of us, having agreed to limit our profits voluntarily at some reasonable level, had said to our employees: "Listen, men and women. This is the people's money we are using. We're all working for the public. We owe them and ourselves an honest day's work. Under the job classification systems and various incentive plans in our companies there is no limit to the money *you* can make provided *you produce*. There isn't any need to change wage levels. All you have to do is improve your skills and then produce more goods. It won't profit the company any. We have limited our profits. But it will profit you. It will reduce costs and it will help us to win the war and the peace." Where this was done there was no "labor trouble." On the contrary, there were E pennants.

Under such leadership as this all hands could have had the satisfaction of cooperating with one another in the common cause, and each one of us could have had a sense of importance and personal pride in accomplishment.

This is the cooperative type of leadership. Remember World War I? Remember the meatless, wheatless, gasless, heatless days? Remember how a handful of leaders under Herbert Hoover organized and administered that enormously effective nationwide voluntary process? Who heard of black markets in those days? The power of public opinion was far more effective than this war's invocation of "the law."

Remember, too, how an apparent shortage was soon turned into a glut of meat, wheat, gas, and heat? It is too bad we forgot that method during this war. Impressed by the so-called "efficiency" of the compulsive processes we tried to apply it in America. We produced in spite of it. But imagine what we might have done under good American cooperative leadership! An illustration is the success of the war loans.

POLITICIANS NEED VOTES

You can't blame some politicians for catering to most votes. Their stock in trade is to make friends, impress people, and sell themselves to their constituents. And they're good salesmen. They have to be good! Otherwise they'd be out of a job.

You can't blame the power-hungry type of labor leader. He faces a lot of inside competition. His stock in trade is trying to get more and more for less and less. And even if he gets the moon he must still keep yelling, "Gimme," otherwise one of his competitors will

steal his job by promising the planet Venus.

But you can blame the employer if he is made to play the villian of the piece, when in real life he is the hero. He produces things. He can really safeguard the security of his workers, his customers, and his partners. And the sum of all the employers, all the employees, and all the customers totals to a lot of votes.

What I mean to say is that management must accept the responsibility for a large share of the current confusion. If it lets a handful of outsiders undermine its position with workers and customers it has itself to blame. Today all of us can agree with our local unions. It's the handful of "International" boys fighting among themselves for power that violates or repudiates these agreements with impunity. **We need to help honest labor get rid of its old man of the sea.**

BATTLE FOR CONFIDENCE

Even with all the cards we should still have to play the game. And the game today is a battle for public confidence. Thousands of employers already have this confidence. They share the proceeds of their enterprises justly. Similarly, many employers have had the support of their stockholders, fellow-workers, and customers in hard times. But we don't get them into the headlines, and headlines make public opinion.

That's why a principal executive today must be his own public relations man, and work at it, if he is going to compete with experts who spend all their time in the business of creating public opinion. And the foundation of sound public relations is sound human relations.

The modern executive needs to be a smart spokesman free to function in his own personality rather than made to dance to strings manipulated by backstage powers. He accepts public responsibility and is entitled to full authority. But more than anything else he needs to direct the efforts of his business association into this field.

Two years ago it looked as if the aircraft industry could not survive reconversion. Then the moribund Aeronautical Chamber of Commerce changed its name to "Aircraft Industries Association," reorganized so that company presidents really ran it, agreed upon an Air Power Policy and set out to tell the people about it. The policy, which coordinated the public interest with that of the industry, was broadcast primarily by the company presidents personally or through their advertising and publicity organizations. It was beamed inside to employees and outside to neighboring communities, with the result that the industry survived. The public forms its opinion out of the performance of headliners.

BUSINESS SOUGHT SECURITY

Time was when Big Business, while preaching competition for others, sought government guaranteed corporate social security for itself. It wanted to lean on government. And so it invented pressure politics. Its sins have descended upon us.

Now other pressure groups have learned pressure politics. Out of it numerous road blocks have been thrown across the economic path. Tariffs designed ostensibly to "foster infant industry" have removed the pressure for technological progress until the infant has atrophied.

Power-hungry labor leadership preaches the slowdown in fear of a return to hard times when the pipeline is filled. It fears labor-saving devices will add to unemployment. It doesn't want to admit that under good government in a technical era, industrial research and development can provide maximum employment by creating new jobs, new enterprises, and new wealth. It actually denies the principle of low-cost production as the key to the purchasing power when it preaches high rates and the slowdown. The secret of economic and military security among free people lies in cooperation among capital, labor, and government in promoting the creative process of individual initiative and enterprise.

Recently this creative process has been slowed down by artificial restraints sought by pressure groups. All sections of the economy are guilty. The results are obvious on every hand. The most dynamic productive machine in the world has been brought to a clanking stop, even thrown in reverse. **Now the responsibility can be fixed. Government has exercised the authority. It cannot escape its responsibility.**

Personal government has been in the saddle for many years, riding high and using the whip. The record is clear for all to see. Now is the time for industry, agriculture, and every other constructive force to step up and point out the disastrous results. We must restore public confidence in the principles on which this republic was founded. Otherwise Chistian freedom will give way to atheistic slavery, cooperation to compulsion, hope to fear, equality of opportunity to privilege, and the dead hand of bureaucracy will close the throttle on progress.

The time has come for us manufacturers to show the way. We need to get out in the field and sell our ideals and our enterprises. To this end we should reorganize our associations and put them on the offensive. Instead of justifying ourselves to one another, let us join hands and go after public confidence. The people will tell Congress what to do.

We who understand the American way, who have confidence in it and know how to make it work, should rediscover its dynamic, constructive character and sell it back to the people. First we need to set forth our principles. Then we need to organize all our resources for disseminating information in every nook and cranny in the land. Our position is so strong, our people are so sound, that under inspired leadership we could discredit the destructive forces that have throttled us.

But first we must make it clear that the day of exploiting labor as a commodity to be purchased in a free market at the lowest price has long been gone. Labor has rightly won this battle. Progressive management recognizes labor as worthy of its hire. It places no ceilings on its workers' take-home as reward for performances.

The idea of wage ceilings and production slowdown which reactionary labor leadership has foisted on the rank and file in its own selfish search for power is contrary to the worker's interest, and to the public interest. The renegades of American labor have been running loose so long they have now laid themselves wide open.

TIME TO STEP IN

We employers must step in and punch. **We need to strengthen the hand of the rank and file and support able American labor leadership. They will quickly throw out their parasites.**

The time has come for dynamic industrial leadership to reconvert its fighting spirit, revolt against tyranny, and give the United States back to the American people.

My Creed for American Industrialists

I believe *in the United States of America founded in the concept of human dignity and governed by the principle of individual freedom under just law*

I believe *that all just authority derives from the free consent of the governed*

I believe *in the principle of cooperation in the common cause*

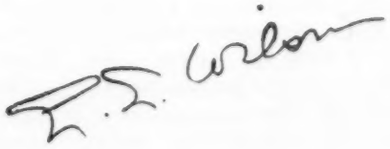
I believe *in the determination of public policy through representatives responsible to the people*

I believe *in the free play of natural forces under public policy so determined*

I believe *in a just government functioning under guiding principles that make it unqualifiedly attractive for each individual to work and create, and to promote his individual security and welfare*

I believe *in individual initiative and enterprise and free creative competition*

I believe *the support of these principles is essential to the end that government of the people, by the people, and for the people shall flourish all over this earth*



MULTIPLE MANAGEMENT IN ACTION. EMPLOYEES AT JOHNSTON COMPANIES PLAY A MAJOR ROLE IN MAKING SURE THERE ARE PROFITS TO SHARE

HOW ERIC JOHNSTON PLANS TO SHARE PROFITS

E. J. STRICKLAND • PACIFIC COAST EDITOR, *FACTORY*

". . . Most of Europe is going hell-bent for socialism. If we believe in capitalism as we say we do, it is about time we went hell-bent for capitalism."

That's Eric Johnston speaking. And that's the "why" behind the labor dividends and multiple management plan adopted early this year in his four Spokane, Wash., companies—which together employ about 400 persons.

Although the plan is unusual and is experimental in the Johnston companies, it's not revolutionary. Both profit-sharing and share-in-management features have been applied before in American industry. Johnston's plan is unusual in interlocking the two in his four companies, in the share of profits to be distributed—25 percent before taxes or dividends—and in the variations made to meet conditions.

Johnston emphasizes that the plan is not automatic. It is not a robot pilot to the Shangri-la of industrial peace. Like any program to minimize human frictions, it will operate only if management works at it as hard as management works in turning out a good product for a good profit.

Basic formula for the profit-sharing plan, developed by the managers of the four companies after nearly a year of study and tours of companies using similar plans, is based on a unit system.

Employees receive:

1 unit for each $100 of annual compensation.

1 unit for each year of service.

5 units for each term on junior board of directors, non-cumulative and for current year only.

5 units for supervisors.

15 units for assistant department managers.

25 units for department managers.

Applying that formula to the four companies, each of which is independent and has its own plant, although

their operations may dovetail, was one of the first problems in which the companies' junior boards of directors took a hand. Set up as the basis of the multiple management plan at about the same time the labor dividends plan was announced, the boards are made up of seven or more members representing all groups in the plants. Similar to the junior boards developed by McCormick & Company, Baltimore, they are expected to devise and present to senior management finished plans for the improvement of the company's business, upon ideas referred to them by senior management, developed by the committees, or suggested by employees. Most management problems, particularly if they involve policy and operating practice, are studied by the junior board.

PLANNING FOR EXPANSION

The basic formula for profit sharing was not changed in adopting it at the Brown-Johnston Company—oldest of the four companies as far as Johnston's interest is concerned, and his first business venture. The junior board does anticipate some special handling when full-scale selling of electrical appliances is resumed, to take care of salesmen. The Brown-Johnston junior board was installed several months before the others, has been in operation about a year, and has been chiefly concerned with improvements in records, stock work, deliveries, and merchandising activities. It has, in its monthly meetings, planned future activities when the company may expand as sales volume increases.

The labor dividends plan has not been completely settled at Columbia Electric & Manufacturing Company (wholesale division)—the electrical equipment wholesaling company, now employing about 40, that grew out of the Brown-Johnston retail business. Sales compensations that are geared to volume and evaluating the work of "outside" salesmen complicate the plan here. However, the junior board, which includes three women employees, has already studied and revised the billing system, on the suggestion of a non-board member. The new system will result in substantial savings. "Management thinking," arising since adoption of multiple management, has also resulted in the warehousemen undertaking job training study on their own initiative to increase the efficiency of their department and broaden their knowledge of electrical supplies. The program is broadening, as other employees become interested, into a voluntary job training program.

At the factory division of Columbia Electric—also an independent company growing out of Brown-Johnston—more changes have been made in the labor dividends plan than in any of the other companies. From a war peak of about 400, employment has fallen to about 100 and is now well below full-time capacity. Because it was impossible to forecast the manufacturing company's future sales level or labor force, several unusual precautions were necessary to apply profit sharing to 1946 operations.

As one precaution the factory force was told that at least 15 percent of any profits would be distributed by the basic plan regardless of fluctuations in operations or personnel changes. This is a precaution only and does not indicate that the company will necessarily deviate from the 25 percent pattern.

The junior board also has asked that credits to its members for service be suspended. The premium for supervisory and departmental functions has been set at a flat 10 points for all hands. The requirement that an employee have one year's service before he is eligible to participate and the extra units for seniority have been waived. The changes liberalizing the plan in favor of the younger worker arise from factors peculiar to the company. The board here meets weekly rather than monthly, and the last meeting of each month is a dinner at the expense of the company.

This junior board has instituted improved systems in factory departments and, in one instance, got some first-hand management experience. It recommended changes in factory working hours and then had to reverse itself when it became clear it had overlooked factors important to workers.

A different problem arose at the Washington Brick & Lime Company—different from the other companies in that it did not grow out of Brown-Johnston and in that Johnston is chairman of the board of directors and not president. The brick company does not operate from a single central location—as the electrical companies do—but has three plant units at two outlying locations, the farthest about 30 miles from Spokane. About 150 persons are now employed, a total below normal because recovery from reduced wartime operations is not yet complete.

To insure proportional representation, board rules require that at least two members of the junior board be from each outlying location and at least two from the general office in Spokane. Members from the outlying plants function as subcommittees for their plants and help coordinate activities.

The board adopted the profit sharing plan without major changes and

THE BASIC PLAN FOR DIVIDENDS

A labor dividend of 25 percent of profits, before taxes or dividends, subject to verification by independent audit, is to be paid to employees, in proportion to their total units of credit from the following table, and in accordance with the rules given:

For each $100 of annual compensation	**1 unit**
For each year of continuous service	**1 unit**
For each 6 month term on junior board of directors during current year only (Max. 10)	**5 units**
For supervisor	**5 units**
For assistant department manager	**15 units**
For department manager	**25 units**
For specialized personnel and positions, as appropriate and consistent in each case	**various**

Payment will be made in a lump sum immediately after end of year.

Termination of employment, voluntary or otherwise, at any time during year, cancels all participation rights. Ordinarily, layoffs or leaves of absence do not impair participation rights.

Ordinarily, employees must have completed a year of service before the beginning of the accounting year to share in that year's labor dividend.

The company reserves the general right to withdraw the plan at an appropriate time and upon due notice.

Capitalism gave Eric Johnston an opportunity to develop a small electrical retailing outlet into four companies. He believes every man should have a chance to "bet on himself"

presented it to employees. It is also studying a plan for improved personnel practice including an orientation course for new employees.

The Johnston companies' plan is a laboratory case for development consistent with Johnston's theory of capitalism. There are no abnormalities in the companies affecting operation of the plans. Production workers in the four companies belong to AFL unions with a total of six crafts and about the same number of locals represented. Labor relations are generally amicable.

It was announced that no changes in wages, working conditions, or in labor relations would be involved or contemplated because of the new plans. Union officials were informed of the purpose and scope of the plans and have taken no official action or position on them.

Originally, senior management appointed members of the junior boards. They have a cross section of office, sales, and factory employees. Each board selects its own chairman and secretary. The managers of the company are ex-officio members, although they do not usually attend meetings.

After the original selection, members are elected by the board itself. Every six months, each member rates all members, except himself, on efficiency, leadership, and other factors on a merit rating schedule. The five members with highest scores remain on the board another six months. They form a nominating committee and fill the vacancies by electing members from the best eligible managerial material in the plant. Top management executives or senior board members are the only employees not eligible.

Because of the short time the plans have been operating, and possible changes in volume and personnel, no official of the companies would hazard a guess on what the profit sharing plan might mean in dollars and cents to employees this year. FACTORY, however, has applied the formula to a hypothetical case to show how the premium point plan might work out.

Experience has been too short, too, to evaluate the multiple management plan fully. Executives of the four companies advise, though:

1. Application of any formula must be carefully fitted to conditions in the company.

2. Every part of the program must be carefully explained to employees.

3. Plans are above the zone of labor relations.

4. Management must be prepared for realistic reaction from employees.

5. Plans must be sincere, capable of being lived with. They cannot pull labor relations chestnuts out of the fire.

Reporting on progress to date, Spokane company officials say unanimously that the plans have given a lift to morale. New ingenuity is being applied to old tasks, new interest is shown. With the help of the two plans, the Johnston companies expect continued progress toward a happier, healthier, and wealthier future for their companies and their employees.

HOW JOHNSTON EMPLOYEES WILL BENEFIT

(a hypothetical case)

ASSUME: *Profits before taxes and dividends of $50,000.*

ASSUME: *Following personnel and conditions:*

	UNITS			
	For Earnings	For Service	For Jr. Board	For Position
Manager, given 40 units, as such, earns $12,000, 15 years' service, nothing for junior board	120	15	–	40
Three department managers, given 25 units each as such, earn total of $18,000, 25 years' total service, and three terms on junior board, aggregate	180	25	15	75
Two assistant department managers, given 15 units each as such, earn total $9000, 10 years' total service, and two terms on junior board	90	10	10	30
Four supervisors, given 5 units each as such, earn total of $14,000, with 15 years' total service, and three terms on junior board	140	15	15	20
SUBTOTALS:	530	65	40	165
Sixty other employees, earning total of $155,000 in year, with 150 years' total service and no credits except for four terms on junior board	1530	150	20	–
TOTALS:	2060	215	60	165

TOTAL UNITS ALL EMPLOYEES

Total labor dividend (25 percent).... $12,500
Value each unit 5.00

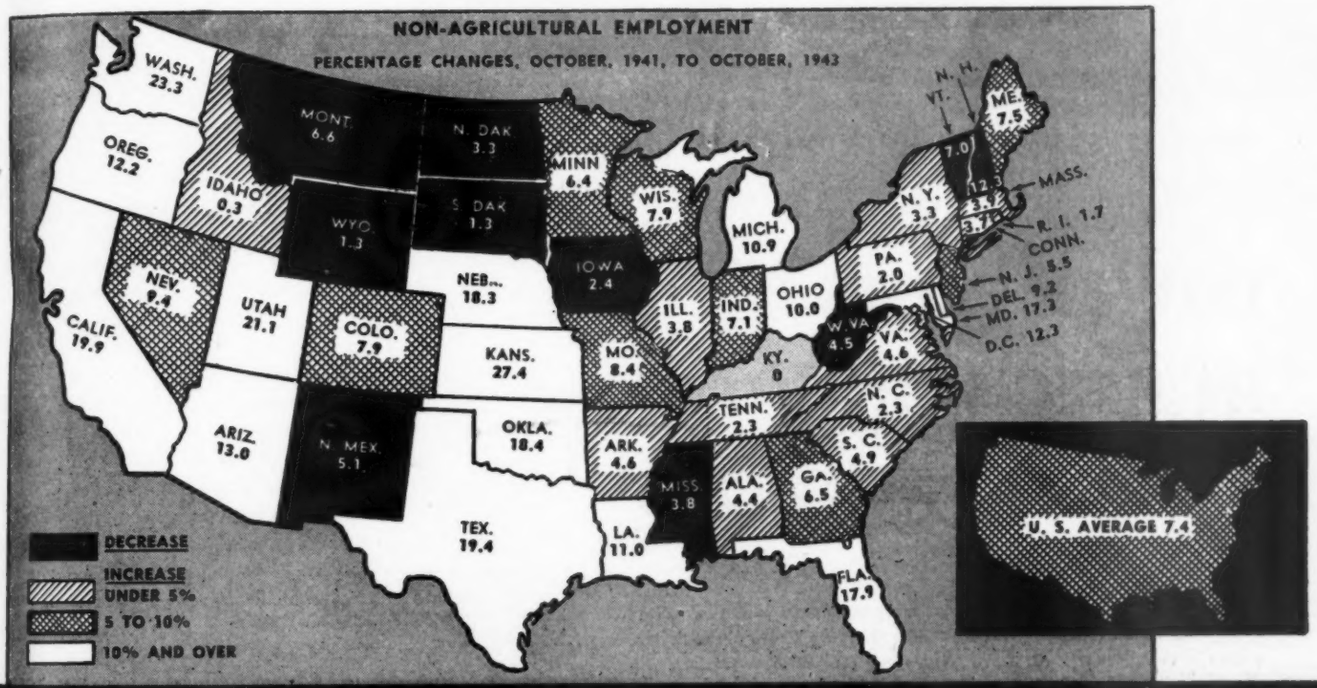
Average management and supervisory employees.. $400.00
Average other employees..... 141.67

JOB CHANGES DURING THE WAR

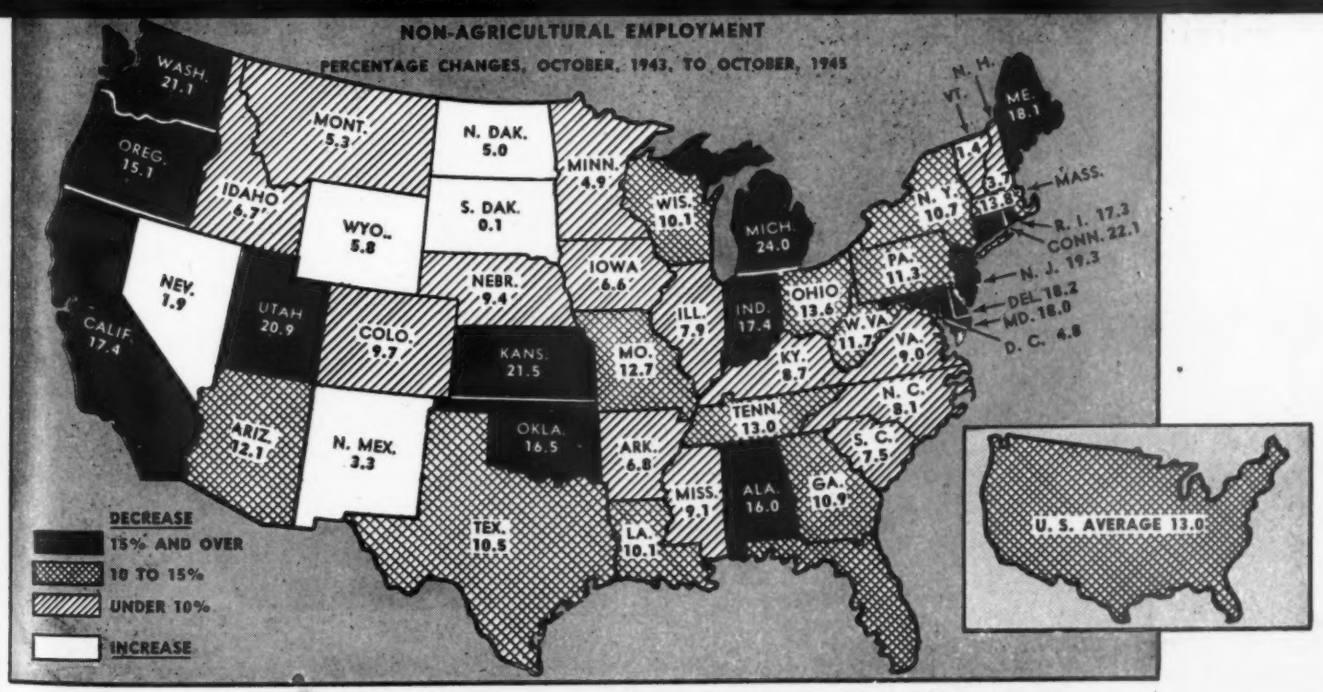
How non-agricultural employment shifted by states from October, 1941, to the wartime peak of October, 1943, and from the wartime peak through October, 1945, is shown in the two charts below.

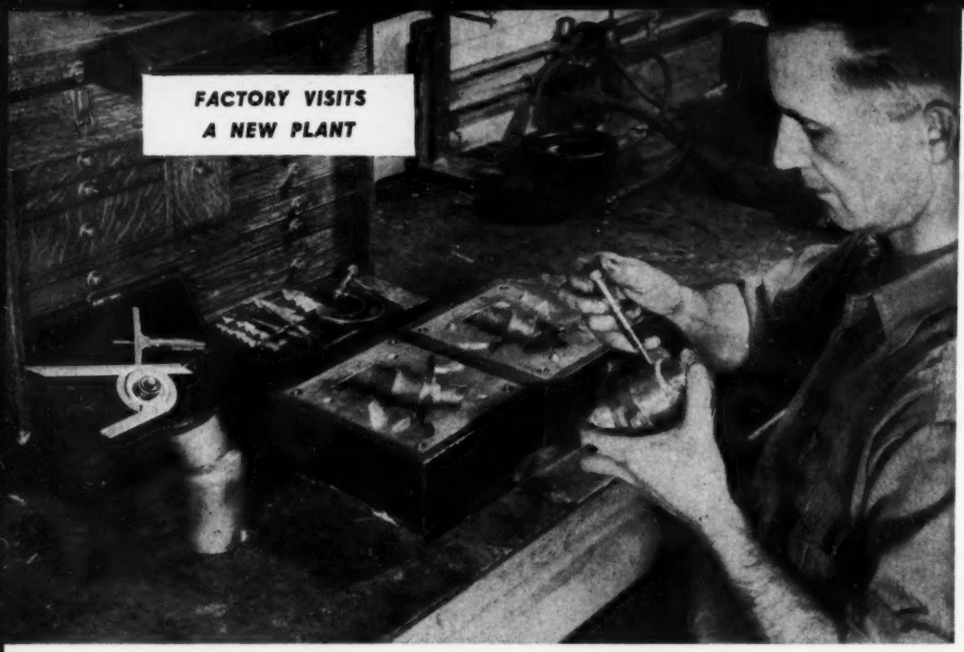
The most marked changes took place in the Southwest and Pacific areas. Only seven states and the District of Columbia reported a net gain over the four-year period. Texas experienced the only substantial increase, with a net addition of 80,000 workers.

Total non-agricultural employment in October, 1945, was fully 5,000,000 below the peak. This decline was almost double the expansion of the two preceding war years. *Source:* U. S. Bureau of Labor Statistics.



These charts are based on National Industrial Conference Board figures and are published in NICB's series, "Road Maps of Industry"





INJECTION DIES ARE PREPARED FROM MASTER PATTERN. DIE CAVITY IS DUPLICATE OF PATTERN

LOWER COSTS IN PRECISION WORK BY MASS METHODS

How methods and equipment, developed during the war to process a single item in million-lot quantities, have been adapted by Haynes Stellite Company to the peacetime production of hundreds of orders in thousand-lot sizes. Result: High-speed production of precision products at low unit costs

WAX USED IN PRECISION CASTING IS BLENDED FROM RAW MATERIALS AND MOLDED INTO BLOCKS

High-speed, mechanized, conveyorized production, as now set up at Haynes Stellite Company's newest Kokomo, Ind., plant, provides a good example of how mass production techniques can be applied to precision work.

Here methods and equipment developed during the war to process *a single item in million-lot quantities* have been combined with even newer techniques to handle *hundreds of peacetime jobs of thousand-lot size.*

Exact savings cannot be computed. They are difficult even to estimate because there is no "old" method to measure them against. But sure-fire advantages include such inevitable benefits of mass production as (1) straight-line flow of work; (2) minimized manual handling; (3) shorter manufacturing cycle; (4) improved quality; (5) increased output per man-hour; and (6) low unit costs.

Haynes Stellite had made precision castings experimentally since 1937. But not until the war did the company really get into quantity production.

First major item was a turbo-supercharger bucket. In the earliest days, daily shipments of good buckets could be carried out in a man's hand. In the peak month of April, 1944, 2,100,000 buckets were produced.

With peacetime operation the process has become available for a wide range of products. It is primarily advantageous for the production of shapes or alloys difficult to machine, fabricate, form, or forge.

The production layout and flow diagram on pages 100 and 101 tells the story. Production begins at one end of the plant. Finished work moves out the door at the other.

Flow of work is straight-line, as close to non-stop as practicable, with much of the moving done mechanically.

Note the five belt conveyor lines (two now in operation, three more to come) on which wax patterns are assembled. Here—see photographs on facing page—operators pick work off the belt, return work to it. An overhead chain conveyor then picks up where the belts leave off, and delivers the flasks containing the wax patterns to the next department. After the metal is poured, a second overhead chain conveyor moves the work to the knock-out machines.

CONTINUED ON PAGE 100

WAX INJECTION. GUN IS INSERTED INTO DIE AND INJECTED BY MEANS OF A PNEUMATIC RAM

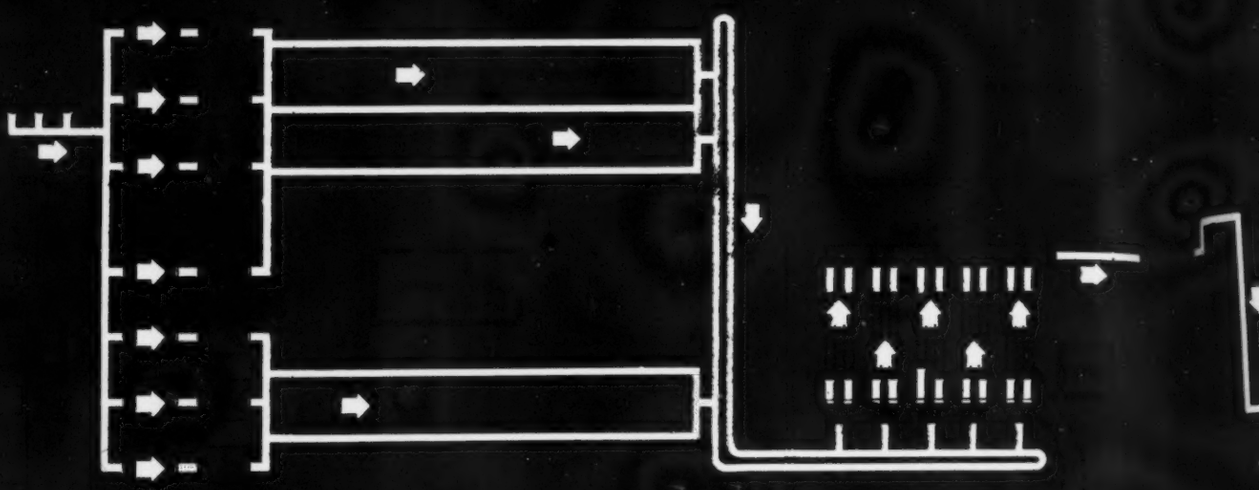
WAX PATTERN IS REMOVED, GATE BROKEN OFF

TWO WAX ASSEMBLY LINES ARE NOW IN OPERATION. PLAN CALLS FOR ADDING THREE. CONVEYORS MOVE PATTERNS FROM ONE OPERATION TO NEXT

Operators on assembly line inspect wax patterns as they move by on conveyor belt. Patterns are then assembled to gates and risers by wax "welding," and mounted on specially molded wax hubs

Flask containing wax pattern is sealed to steel plate, conveyed by chain to "investment"

STRAIGHT-LINE FLOW MAKES POSSIBLE HIGH-SPEED PRODU

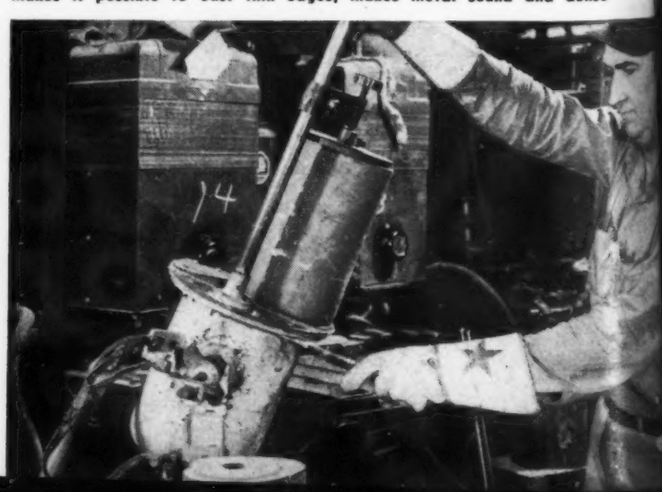


ONLY JOBS OF SUFFICIENT QUANTITIES TO JUSTIFY ESTABLISHMENT OF PRACTICAL PRODUCTION PROCEDURES ARE PUT ON THIS HIGH-SPEED SET-UP

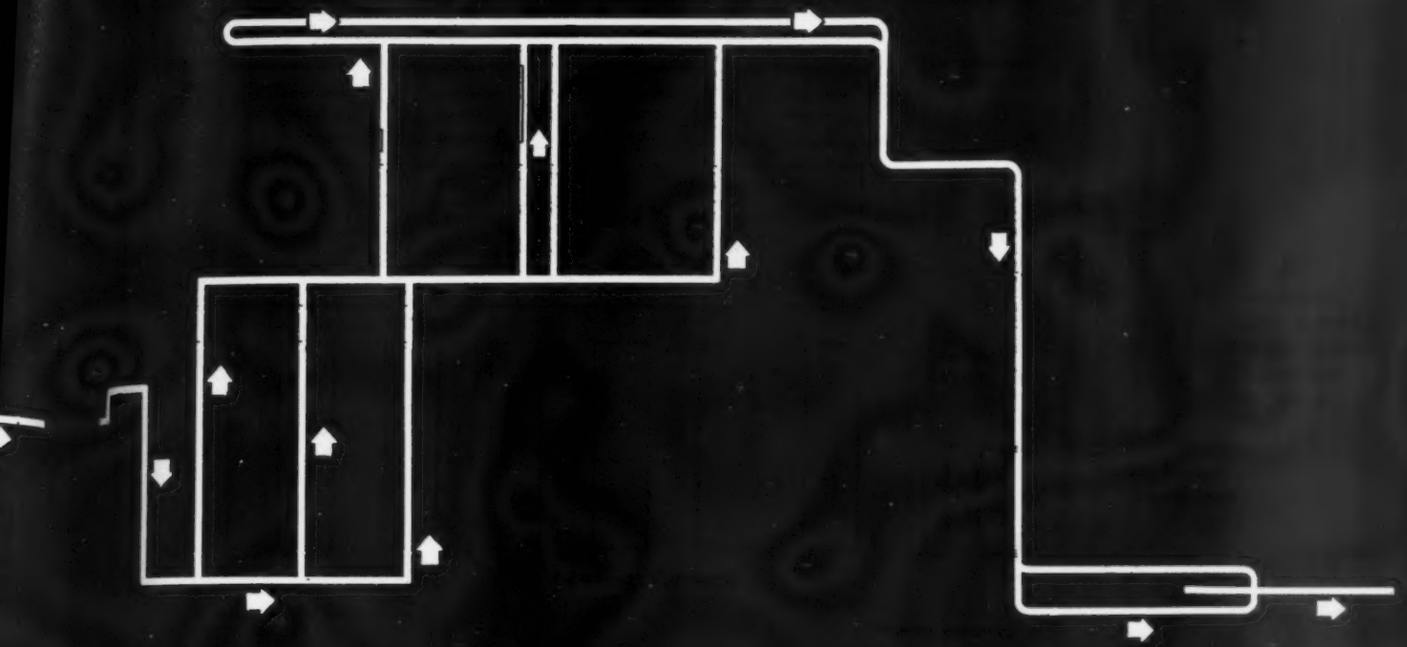
Chain conveyor moves flask containing wax assembly to investment department where it is filled with a chemically hardening material

Dewaxing. Molds are placed upside down in continuous furnace where wax is melted. Residue is burned out as molds move into hotter zones

Castings. Hot mold is inverted and clamped to small indirect-arc furnace. Molten metal is poured by inverting furnace. Air pressure makes it possible to cast thin edges, makes metal sound and dense



-SPEED PRODUCTION OF PRECISION CASTINGS BY LOST-WAX PROCESS



HEAVY WHITE LINES AND ARROWS INDICATE FLOW OF WORK

Assembly is knocked from mold. Excess investment material is removed, and casting is conveyed to point where gates and risers are cut off

SEQUENCE OF OPERATIONS

1. Die making. Master pattern fabricated. Injection dies prepared of a suitable soft metal from the master pattern.

2. Wax Blending. Wax blended from raw materials. Molded in blocks. Blocks melted as needed to load "guns."

3. Wax Injection. Cores placed in die. Wax is injected by means of "gun" inserted in die and emptied by pneumatic ram. Wax pattern removed from the die.

4. Wax Assembly. Wax patterns inspected as they move by on conveyor belt. Patterns assembled to risers by "wax welding," and mounted, usually in clusters, on wax hubs.

5. Coating. Assembly dipped in fine silica suspended in suitable medium. Pouring end mounted on steel base. Somewhat coarser grains of silica "stuccoed" to dip coating.

6. Drying and Assembly of Flask. "Stuccoed" assembly carried through dehumidifying tunnel by conveyor belt. Flask wrapped in wax paper sealed to the steel plate with wax.

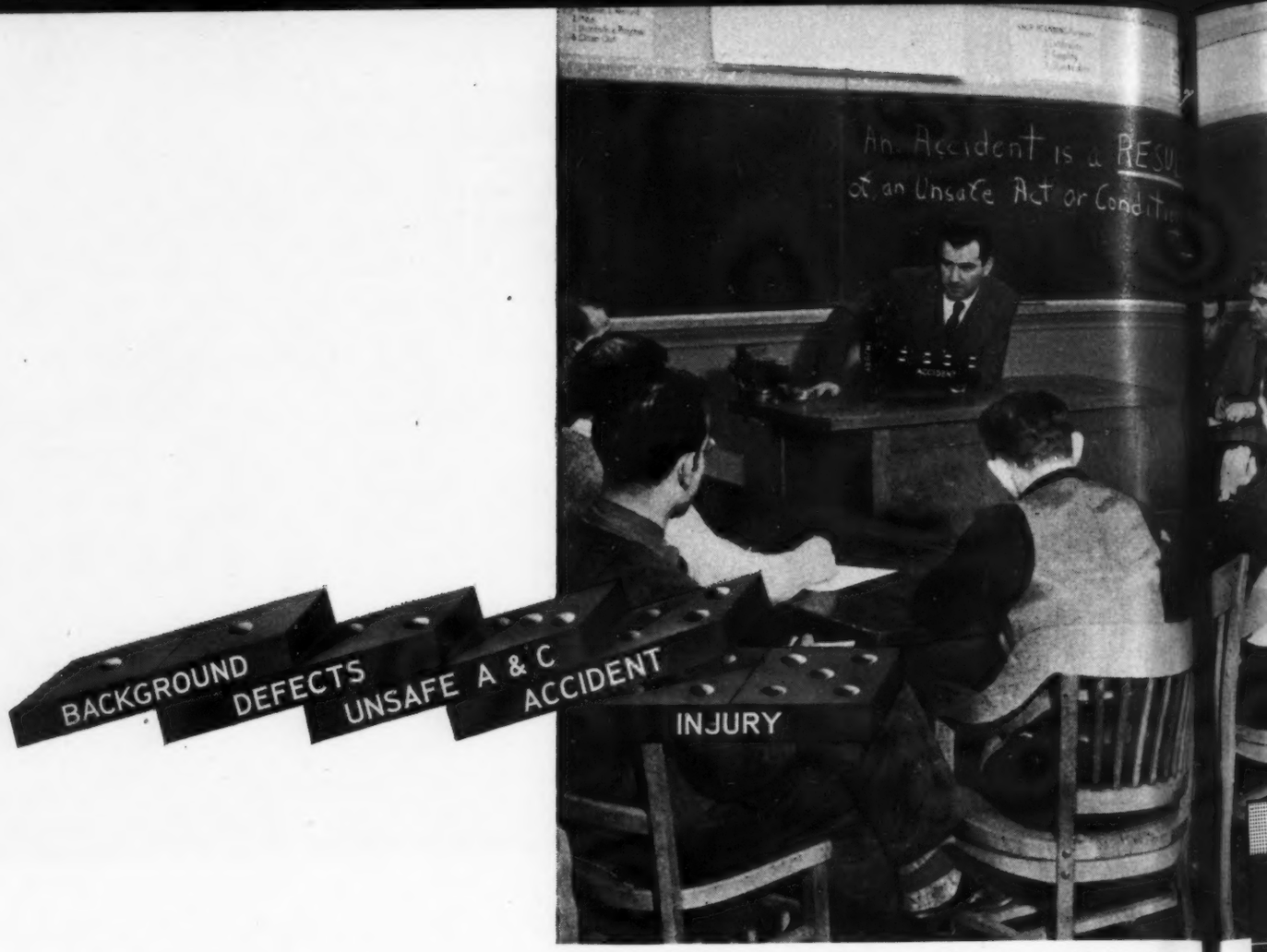
7. Investment. Flask containing wax assembly conveyed to next department. Filled with chemically hardening investment material. Placed on vibrator, or "shaker" table.

8. Dewaxing. Excess investment material cut off. Steel plate knocked off. Mold alowed to age. Placed upside down in continuous furnace, Wax melted out. Investment material hardened.

9. Casting. Hot, baked mold clamped to pouring spout of small indirect-arc furnace. Molten metal poured by inverting entire furnace and applying air pressure.

10. "Knock-Out." Casting assembly knocked from mold by pneumatic hammer. Excess investment material removed. Cast assembly carried by conveyor for removal of gates and risers.

11. Finishing. Gates and risers removed. Castings shotblasted. Castings sandblasted then inspected.



Author uses dominoes to show that injury comes after a sequence of factors, that the accident and injury can be stopped by removing one of the first three dominoes

SELLING SAFETY TO SUPERVISORS CUTS ACCIDENTS 67 PERCENT

ALFRED R. LATEINER • FORMERLY SAFETY ENGINEER IN CHARGE OF TRAINING U. S. NAVAL SHIPYARD, BROOKLYN, N. Y.

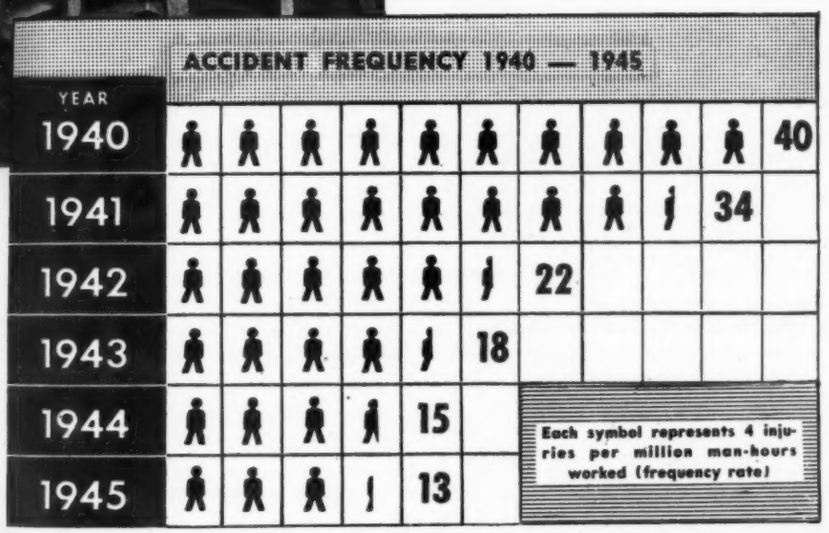
A training course in accident prevention at the U. S. Naval Yard in Brooklyn, N. Y., specifically aimed at all grades of supervisors, is being credited as a major factor in a two-thirds reduction in accident frequency over the past 5 years.

This record was made despite severe handicaps imposed during the war years by (1) tenfold increase in number of employees; (2) many inexperienced employees, some very young, some over-aged, and some physically handicapped; (3) "hot" jobs that had to be rushed; (4) 60- and 70-hour work weeks, also night operation; (5) draft calls on many civilian key men; and (6) many women in arduous jobs.

When the call came, in 1940, to multiply the production of ships, it was realized that man-hours were the essence of high production, and that reduction in accidents was an important factor in obtaining efficient production.

Accidents reported for the past several years were studied for primary causes—i.e., an unsafe practice or unsafe working conditions. It was found that 80 percent were caused by the wrong action of some employee, and only 20 percent by unsafe conditions.

This indicated the need for a new accident-prevention technique, since the then existing safety effort was focused on improvement of physical and mechanical flaws in plant and equipment. An



Training more than 6000 supervisors in safety procedures at the New York Naval Yard resulted in a two-thirds reduction in accident frequency in a period of 5 years

employees' safety program, based on accepted publicity methods, was already in operation, but apparently this program was not getting the idea fully across to the employee that he must work safely, or else it was failing to tell him how to apply safety principles.

Bringing this trend of thought to a conclusion, better training of employees was conceived as the new approach to a better safety record. For best results, it was decided to concentrate the training effort on the 6000 supervisors of all levels, for these reasons:

Supervisors were in immediate control both of the acts of workers and of working conditions.

Supervisors could best be delegated specific authority for accident prevention—to avoid everybody's job becoming nobody's job.

A general pattern for setting up a training course was already available in the government-sponsored Training Within Industry program. Methods used in this program were adopted for a JST (job safety training) course of group training. Five objectives for this course were: (1) Enable supervisors to understand the inflexible sequence of events that leads to all accidents and injuries; (2) analyze and discuss the basic accident causes; (3) develop best corrective procedures; (4) apply these procedures to the job; (5) show what to do when an accident occurs.

The guided conference method of instruction was deemed most suitable for attaining the objectives of the course, and five 1-hour classes were planned for training in how to accomplish each of the five objectives. A series of questions was so arranged by the group leader that supervisors would think out the problems of safety.

Training started with a pilot group of 12 machine-shop foremen, in a suitable classroom that provided a blackboard. Tables and chairs were arranged in a U-shaped formation, with the group leader at the open end of the U. This permitted each person to see and face every other person, and also avoided inhibiting "classroom atmosphere."

This pilot group showed considerable enthusiasm in the opportunity to discuss and develop safety ideas. There were plenty of kinks and slow spots in the first series of meetings, and several controversial points were not brought to an acceptable conclusion, mainly because:

1. Leader had not yet developed logical methods to handle group questions on key points.

2. A few talkative foremen took the floor away from the less aggressive men.

3. Minimum of blackboard work led to fuzzy thinking and deviation from the subject of the conference.

4. There was too much free-for-all discussion—with a train of thought but no terminal to pull into.

5. Specific cases were discussed subjectively instead of discussing fundamental principles objectively.

As the course progressed, it was subjected continually to critical analysis and reexamination. Adjustments and revisions, in the light of revealed deficiencies, led to a point of comparative standardization with methods that had proved their value.

In its final development, the course used a specially printed 15-page pocket-sized booklet, which provided an outline of the main points stressed in each of the five hourly sessions. The booklet contains illustrations, provocative questions, and space for writing in the correct answers as they are developed in group discussions. Groups were eventually limited to 12 to 18 participants. It was proved from experience that training should begin with the highest level of supervisors, in order that application of the safety program would work down through all levels and have supervisory backing all the way.

THE HOURLY SESSIONS

FIRST HOUR: OBJECTIVE. To define an accident as a result of controllable acts or conditions, and to reach the conclusion that supervisors can reduce accidents.

METHOD. The leader introduces himself, and makes sure all

men in the group know one another and the nature of everyone's job. He then explains the purpose and plan of the series of meetings, and emphasizes that the classes will not be lectures, but "give-and-take" discussions. The company's accident record is shown, and the necessity for improvement is proved.

The group is asked to define an accident, which leads to the fact that all accidents are caused basically either by unsafe acts by workers or unsafe working conditions. The "domino" sequence developed by H. W. Heinrich* is employed to demonstrate that all accidents are avoidable by removal of these two basic causes. This can best be accomplished by each supervisor, and not by the safety engineer, manager, or top executive, because the supervisor sees the daily acts of workers and local conditions better than anyone else, and has authority to remedy unsafe acts and conditions.

SECOND HOUR: OBJECTIVE. To show supervisors the nature of causes of accidents, which they can eliminate.

METHOD. The agreed conclusion of the previous meeting that it is the supervisors' responsibility to reduce accidents is enlarged upon by requiring the group to build a list of various types of unsafe acts and conditions from their own experiences. This list is translated into the terms of the standard cause list of the American Standards Association, involving nine classifications of unsafe acts and eight classifications of unsafe conditions.

At the close of the session, the supervisors are given an assignment to observe acts of their workers and working conditions in their own departments. They are to note all unsafe acts and conditions for reporting at the next session.

THIRD HOUR: OBJECTIVE. To show supervisors how they can correct unsafe acts and conditions.

METHOD. Reports of supervisors on unsafe acts and conditions found in their own departments are received and interchanged. A study of these reports is made, which suggests that a corrective procedure for all unsafe acts and conditions should be developed and agreed upon. By a series of calculated questionings and pre-planned demonstrations, the leader has the group develop the following formulas for the supervisor:

1. When he observes unsafe acts of a worker, he must (a) stop the act; (b) study the job (or know the job); (c) instruct worker in correct method (tell-show-try-check); (d) follow up; (e) if necessary, discipline.

2. When he observes an unsafe condition, he must (a) preferably remove it; (b) otherwise, guard it; (c) if this cannot be done, provide warning; (d) if supervisor can't handle, then he is to recommend change to own boss, maintenance department, or safety director; (e) follow up.

Concluding this hour, supervisors are again assigned to observe and list all unsafe acts and conditions in their departments, but this time also to apply corrective procedures. Results are to be reported at the next session.

FOURTH HOUR: OBJECTIVE. To prove from application of principles already discussed, as revealed in reports on last assignment, that corrective procedures by supervisors are most effective means of accident elimination.

METHOD. Reports are discussed, with emphasis directed on the facts that (1) good results are easily obtained; (2) it is a definite part of the supervisor's job, and (3) the responsibility for safety is a continuous, everyday job.

The fourth hour is completed with a guided discussion, supported by an exhibit, on the method of procurement and proper use and care of personal protective equipment.

FIFTH HOUR: OBJECTIVE. To teach supervisors what to do when an accident occurs.

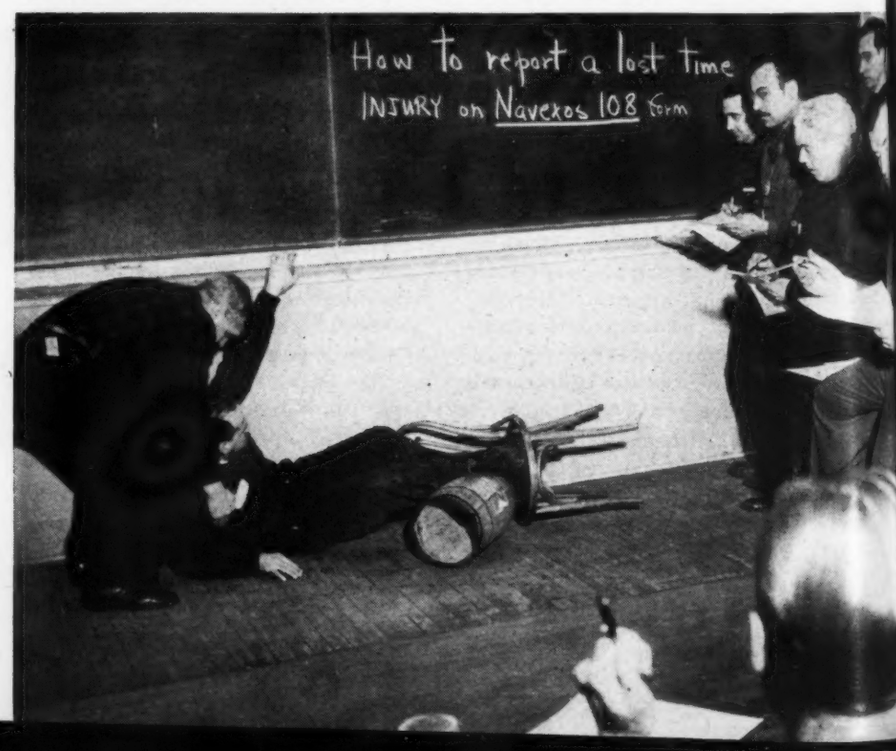
METHOD. First aid procedure and policy are explained, followed by discussion as to why accident report forms are needed. Each supervisor is given a blank accident report form, which is filled out by the group step by step, using a simulated plant injury as an illustration.

The course is closed with a review of all major points brought out in all the five sessions, with emphasis on the need for daily application of the principles that have been developed and agreed upon by the group thinking.

The benefits of this safety training course were not long in the reaping. As the supervision of each large department was trained, the frequency rate of reportable injuries showed a marked decrease within 20 days. Nine of the first ten departments showed decreases of 25 to 50 percent, which were sustained for 3 to 4 months. After that time slight increases were noted, which were counteracted by a 1-hour refresher session. In this experience was proof that training for accident prevention is a continuous job, and that even the course provided for supervisors needs to be followed up.

Another notable result of the course was the attainment of objective and standardized accident investigating and reporting by the supervisors. From this flowed obvious benefits in getting proper cause analyses, with consequent elimination of unsafe acts and conditions not otherwise ascertainable.

USING A POSED ACCIDENT, SUPERVISORS LEARN HOW TO MAKE OUT REPORTS



* *"Industrial Accident Prevention," McGraw-Hill Book Company.*

Arrangement of fluorescent luminaires in grid pattern provides uniformly distributed light of 50 foot-candle intensity over entire working area, solves the problem of shadows cast by building columns. Also machine layouts can now be changed without rearranging lighting fixtures

SHADOWLESS LIGHTING

J. R. HAUGAN • PLANT ENGINEER, UNION SPECIAL MACHINE COMPANY, CHICAGO

By the use of a "grid" pattern in the layout of the fluorescent lighting systems in several of its precision machining departments, the Union Special Machine Company, Chicago, has provided a practically uniform distribution of light over each machine area.

This layout was designed to obtain shadowless light under difficult conditions. It had to solve, among other things, the problem of shadows that formerly were cast by 30-in. building columns, located on 20x21-ft. centers.

Another objective of the grid system was the provision of illumination from two directions in such a manner that the operators' heads would not throw shadows on their work. It was also desired to minimize the glaring lines of light reflected from curved machine surfaces to the operator's eyes. Such reflections, besides being a source of eye fatigue, made difficult the reading of calibrations on the cylindrical dials or regulating hand wheels.

OTHER BENEFITS

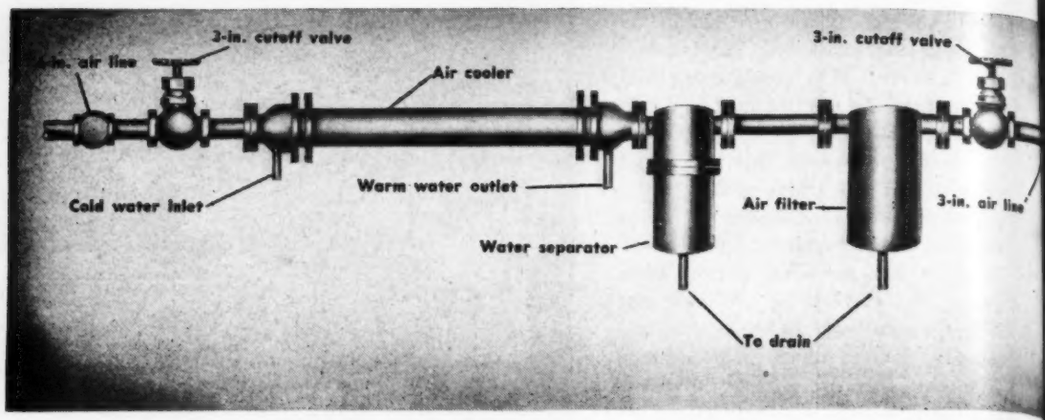
The adoption of the grid design, in addition to attaining these objectives, yielded other major benefits. Because of the uniform intensity and comparatively shadowless characteristics of the light that is being obtained, changes in machine layouts to meet constantly changing production requirements can now be made without rearranging the lighting fixtures. Also, there is no longer any need for local machine lighting at individual points of operation, since the layout was engineered for a light intensity of 50 foot-candles uniformly distributed at machine levels.

Specifically, the layout consists of parallel runs of 48-in. open-end fluorescent fixtures spaced 7 feet apart, paralleling the building columns in one direction. These runs are crisscrossed by similar runs spaced 10 feet apart paralleling the columns in the other direction. Center to center spacings of the fixtures on the axes of these two runs are 10 feet and 7 feet, respectively. As a result, a rectangular grid pattern is formed, composed of 7x10-ft. units of area, whereby each building column is centrally located within every second unit on its 20-ft. center line, and within every third unit on its 21-ft. center line.

The luminaires are suspended from conduit stem mountings on 4-in. swivel covers so that the lower edges of the reflectors are 36 inches below the 12-ft. ceiling height. Each luminaire contains two 40-watt, 48-in., white, 2100-lumen fluorescent tubes, and a corrected power factor ballast, and is rated at 100 watts total power consumption.

Although the new grid system consumes no more power than the former combination—namely, 1200 watts per bay (420 square feet)—the lighting output has been increased markedly. Formerly four incandescent fixtures of 200 watts each, plus individual machine lights totaling about 400 watts, gave an average general lighting intensity of 10 foot-candles, with 40 foot-candles at the point of operation of the machine tool, as compared to the present 50 foot-candles uniformly distributed over the entire area.

The original installation according to the grid layout was made in one area approximately two years ago, and similar installations have since been made in other machining areas. This layout has been found to meet the many requirements of good lighting so well that it has been chosen as a standard for gradual conversion of all lighting in precision manufacturing areas.



THIS EQUIPMENT IS INSTALLED AT JUNCTION OF EACH 3-IN. LATERAL WITH 6-IN. MAIN LINE

FLEXIBLE COMPRESSED AIR SYSTEM MEETS LAYOUT CHANGES

M. R. HARRIS • PLANT ENGINEER, CHEVROLET-INDIANAPOLIS DIVISION GENERAL MOTORS CORPORATION, INDIANAPOLIS

Satisfactory distribution of compressed air probably involves no greater problem than that posed by the manufacturing operations on the press floor of the Chevrolet-Indianapolis Division where truck bodies are built.

As in most automotive plants, the press department is subject to frequent rearrangement of machinery to meet engineering and model changes. Consequently, machine load centers change from time to time without any foreknowledge of what the demands of each subsequent layout will be. This condition therefore necessitates a compressed air distributing system that is flexible enough to absorb these frequent changes without rearranging primary air lines.

At the same time, the compressed air system must meet certain basic requirements. It must be able to supply clean, dry air throughout the various departments at uniform pressure and in whatever volume desired. To insure these delivery functions, adequate pipe sizes must be used in the primary distributing system, and in the secondary piping to each machine.

All these requirements have been fulfilled in the compressed air distributing system that serves the pressed metal department of this plant. Specifically, the design offers the following features:

1. System can always be easily balanced when any unbalance is found, so that no point in the system, when in full operation, is under the requisite 90-lb. pressure.

2. Existing layout is not disturbed by plant expansion.

3. Extra receiver capacity is provided.

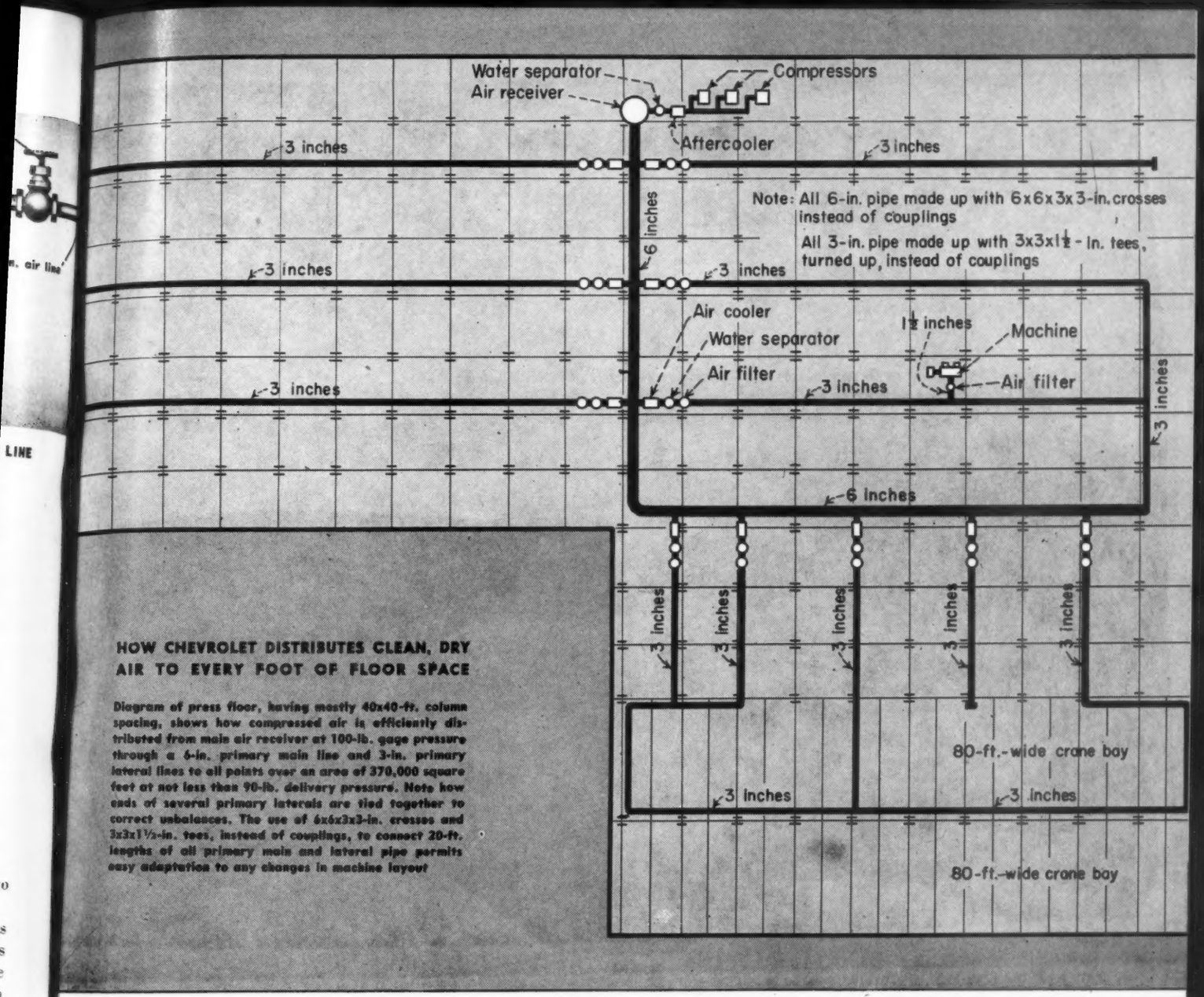
4. System provides efficient cooling of compressed air.

The details of the design and layout of this system are shown diagrammatically in the plan layout. Compressed air is furnished by an installation of three water-cooled compressors of 1000-, 1300-, and 1700-c.f.m. capacity, respectively, located in a compressor room along the north wall of the factory building. This subdivision of compressor capacity is primarily because of additions required by the growth of the system, but obviously it also is conducive to operating economy when light loads permit cutting out one or two compressor units.

From the compressors the air passes through an aftercooler which reduces its temperature to 130 deg. F. The capacity of this aftercooler has been purposely limited because of the extra cooling, as will be seen later, that is obtained in the piping distribution system. From the aftercooler the air passes through a water separator, and thence into the receiver tank, which is equipped with an electric switch control to maintain 100-lb. gage pressure. The air receiver, incidentally, has a capacity of only 142 cubic feet. The reason for this low capacity will be evident later.

Compressed air leaves the air receiver through a 6-in. main distributing pipe. One of the salient features of this air distribution system is the use of large-sized primary distributing pipes. The primary main pipe is 6 inches for its entire length of about 640 feet, while all the primary lateral lines emanating from the 6-in. main line are 3 inches for their entire lengths.

These large-sized pipes function as a reservoir, permitting the use of a



HOW CHEVROLET DISTRIBUTES CLEAN, DRY AIR TO EVERY FOOT OF FLOOR SPACE

Diagram of press floor, having mostly 40x40-ft. column spacing, shows how compressed air is efficiently distributed from main air receiver at 100-lb. gage pressure through a 6-in. primary main line and 3-in. primary lateral lines to all points over an area of 370,000 square feet at not less than 90-lb. delivery pressure. Note how ends of several primary laterals are tied together to correct unbalances. The use of 6x6x3x3-in. crosses and 3x3x1½-in. tees, instead of couplings, to connect 20-ft. lengths of all primary main and lateral pipe permits easy adaptation to any changes in machine layout

smaller air receiver in the compressor room. At the same time, they act as a reservoir near the points of air consumption. Also, by having large-sized pipes, heat in the compressed air has an excellent opportunity to dissipate itself, owing to the comparatively slow movement of the air through the large pipes, and because of the large radiating surfaces these pipes offer.

In construction, the 6-in. main primary lines are made up of standard 20-ft. lengths of pipe, but instead of being joined together by couplings, 6x6x3x3-in. crosses are used. The 3-in. cross openings are plugged when not used as outlets for the primary lateral lines. This plan permits additional primary lateral lines to be installed whenever necessary.

Similarly, the 3-in. primary lateral lines are connected at each 20-ft. length by 3x3x1½-in. tees. All the tees are turned up. This design permits lines to be run to individual machines with a minimum of piping, and brings a good volume of air close to each machine.

At the take-off point from the main line, each primary lateral line is equipped with a compressed air cooler of 350-c.f.m. capacity, a water separator, and an air filter. The warm water discharged from the air cooler is used as make-up water for washing machines and spray booth tanks. Water, oil, and dirt collected in the water separator pass through a trap into a sewer. Water that might carry over into the air filter is handled in the same way.

The cost of placing the subsidiary air coolers in the primary lateral lines is comparable to that of providing equivalent after-cooler capacity in the compressor room, but the plan has the added advantage of easy accommodation to growth. Moreover, it insures dry air at all times to all machines regardless of variations in room temperature, because the air leaves the air cooler at no higher temperature than 70 deg. F.

An air filter is also placed in each line supplying each individual machine. This is to filter out any rust or dirt that might originate between the main filter and the machine.

It will be noted in the schematic layout that several of the primary lateral lines have been gridded or tied together at the ends. This was done when overloading occurred on an individual line. Whenever a change in machine layout creates an unbalance of this kind, it can be easily corrected by this familiar gridding technique, which involves the installation of comparatively short runs of 3-in. pipe.

TWO-WAY INFORMATION FLOW PAYS OFF

Formula for an outstanding employee-employer relationship: *Tell workers the truth; get the truth from workers.* Thompson Products uses it with outstanding success. Any company can do the same. The techniques described in this article are available to all

Thompson people get Thompson news from Thompson first.

President F. C. Crawford, of Thompson Products, Inc., Cleveland, makes sure of that. He handles company problems coming across his desk with the same news sense for his employees that a managing editor cultivates for his newspaper readers—even to hitting the "stands" with an "extra" Saturday afternoons when a "hot" story breaks.

Result — Thompson people back Thompson. Three times in NLRB elections Thompson workers have voted against unions. Typical comment from a Thompson serviceman: "The company has always been fair and square with their employees, so I see no need for the CIO."

Good employee relations consist of far more than a good information program. Thompson has a sound, friendly employee policy. And Thompson's hard-hitting news makes it certain that that policy is understood and that no one, in or out of the company, misinforms Thompson workers about the company.

Thompson's information policy is not one-way, either. The company gives employees all the news it can—first. In return, it gets from employees all the information it can about Thompson workers and how they're thinking. Thompson knows its workers. The workers know Thompson. And that's the basis of one of America's outstanding employee relations programs.

How does Crawford do it?

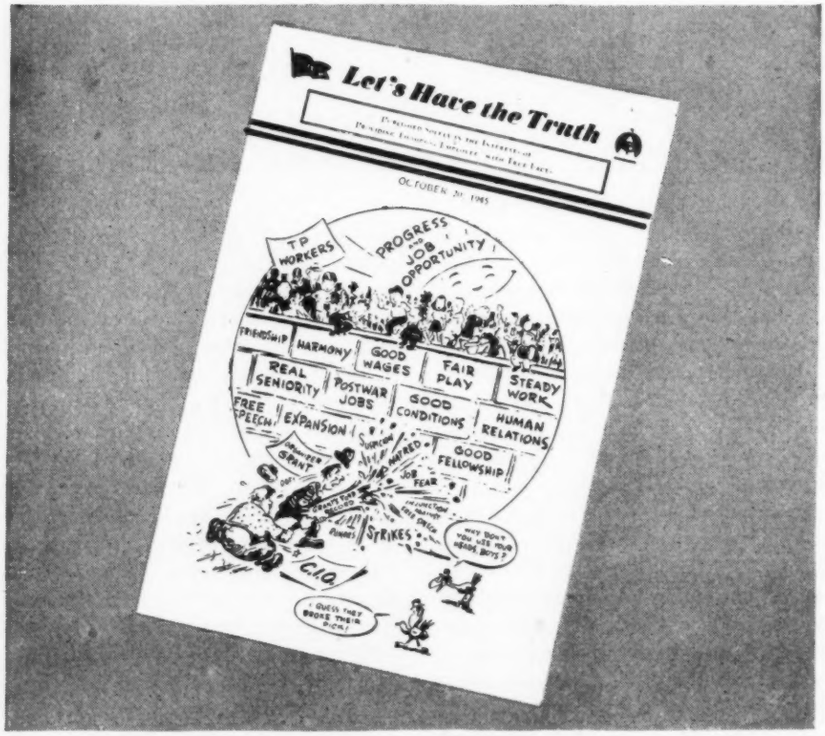
Thompson realizes that industry in its daily striving to produce more and better goods at less cost—in just working to keep the business going—does the majority of the things that give an employee what he desires most. It does provide for security, it does give opportunity for advancement, it does grant recognition to the individual.

Thompson's employee information program goes all-out to tell the employee what the company is doing to meet his needs. It tells him what problems the company is facing, what engineers are working on, what customers are demanding.

The media Thompson uses are available to all companies—and are used by many. But its use of them is unique. It insists that employees have the story first. It even insists that its workers get bad news from the company first.

Bulletin boards are often keys in the timeliness technique. When newspapers and printers are waiting for final figures from the auditors to hit the streets and mails with the annual financial statement, the first release is a bulletin on the boards. Thompson workers see the report before their wives can possibly read it in the newspapers.

Best example of being first with the worst came on a Saturday afternoon—a nice, sunny day for golf. Thompson heard that NLRB in Washington had rejected results in an election in which Thompson people had overwhelmingly repudiated efforts of outside unions to organize the plants.



This is a good example of the straight-talking technique used by Thompson Products to make certain that employees will not be misinformed about the company. Here union publicity techniques are used against the union—because they are techniques that workers understand easily. "Let's Have the Truth" outlines company policies, debunks union promises

Company executives might have sat back, figuring the Cleveland papers would carry the story Monday and they could say "no comment" then. Instead—they sent a messenger for a copy of the report, analyzed it, and printed two bulletins, one for employees, a more complete one for foremen. The night shift going out at 11 o'clock that Saturday received copies. Monday, when the union organizers distributed their literature, hailing the report in big headlines, Thompson people shrugged it off as "old stuff."

There are a bookful of illustrations of "plain talking" growing out of Thompson's perennial scrimmage with union organizers attempting to organize the plants. When an ex-president of the UAW local at Ford came down the road to Cleveland charging that Thompson was guilty of "bossism," "dominating workers," "imposing restraints" on them, and offering to "liberate" them from bondage, Thompson published a series of papers called "Let's Have the Truth."

First step in the campaign was to expose the organizer's record, showing that his administration at Ford had created constant trouble in spite of outstanding working conditions. "Let's Have the Truth" showed that the organizer had been ousted from office in the Ford local with many a charge flying after him. Then it analyzed his complaints and promises, showing there was little truth and little hope in them.

Offsetting all union offers, "Let's Have the Truth" frankly analyzed Thompson's record of fair treatment. It pointed out that production was scheduled to rise 100 percent in some departments, up to 500 percent in others—offering TP workers opportunities a union could never win for them.

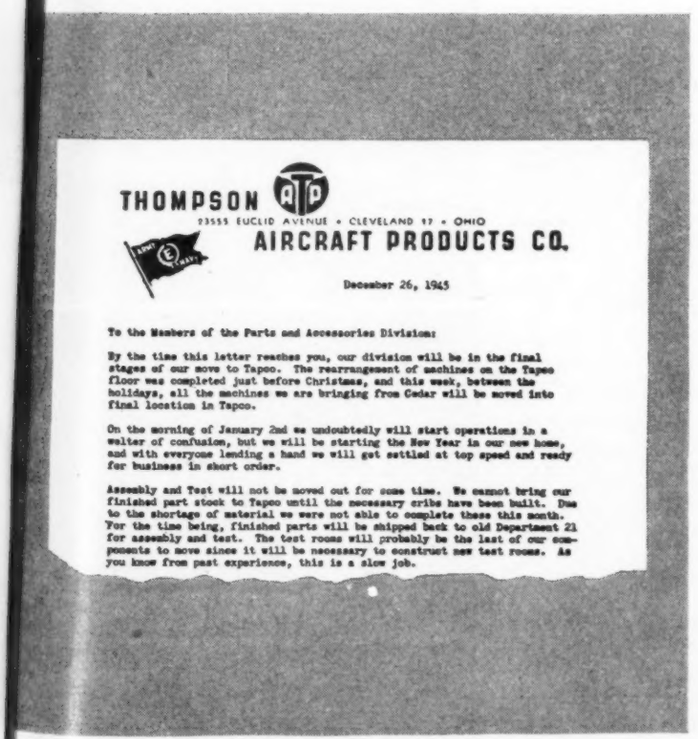
The CIO didn't like such tactics. It used a meeting at which President Crawford spoke—one of a frequent series in which all TP workers hear executives speak on company problems—as the basis of a complaint questioning the right of Crawford to address his employees.

The complaint resulted in a hearing before the U. S. Circuit Court of Appeals in Cincinnati—which sustained the right of a president to address his employees in such meetings on the basis of freedom of speech.

Thompson supervisors were kept fully informed on the organizer's attempt by a series of informal letters giving them all the story well before it broke in the newspapers. Similarly, letters signed by the president, vice-president in charge of personnel, and other executives were sent employees at their homes to inform them—to be sure that the organizers could not misinform them about the company.

The company insisted, during negotiations concerning the election, that its servicemen be allowed to vote. A letter went out to inform them of the prospective election. The National Labor Relations Board turned down Thompson's request to have servicemen included, but Thompson, on the basis of answers to the one letter it sent them, printed a flyer showing how they would vote if they could. In hundreds of replies, only two expressed opinion in favor of the CIO. Excerpts from their letters were reproduced. There was no doubt how TP servicemen felt—and Thompson saw that every worker knew that before the election.

Because it is no longer possible in the sprawling plants to maintain the individual contact possible when the personnel manager knew every man, Thompson has zoned its plants. Each



THOMPSON

23555 EUCLID AVENUE • CLEVELAND 17 • OHIO

AIRCRAFT PRODUCTS CO.

December 26, 1945

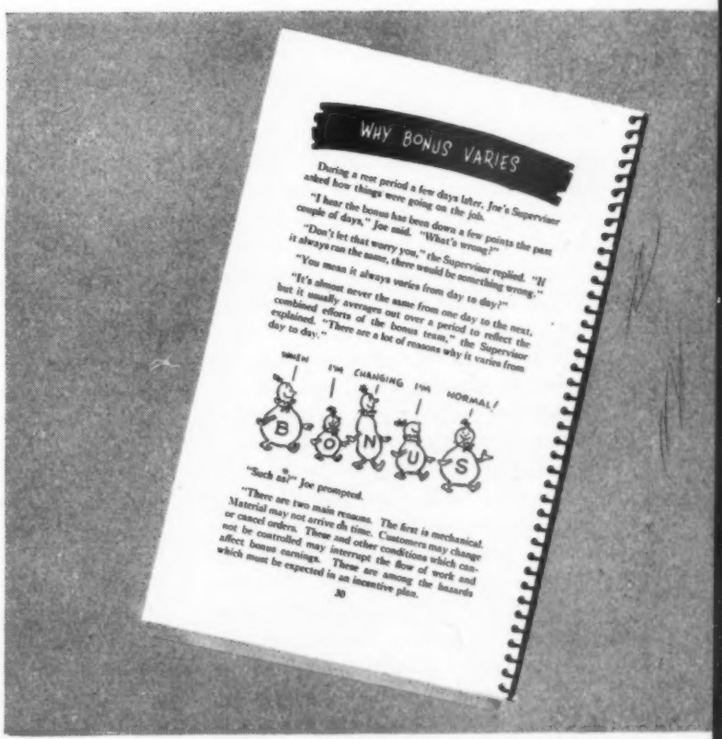
To the Members of the Parts and Accessories Division:

By the time this letter reaches you, our division will be in the final stages of our move to Tapco. The rearrangement of machines on the Tapco floor was completed just before Christmas, and this week, between the holidays, all the machines we are bringing from Cedar will be moved into final location in Tapco.

On the morning of January 2nd we undoubtedly will start operations in a welter of confusion, but we will be starting the New Year in our new home, and with everyone lending a hand we will get settled at top speed and ready for business in short order.

Assembly and Test will not be moved out for some time. We cannot bring our finished part stock to Tapco until the necessary cribs have been built. Due to the shortage of material we were not able to complete these this month. For the time being, finished parts will be shipped back to old Department 21 for assembly and test. The test rooms will probably be the last of our components to move since it will be necessary to construct new test rooms. As you know from past experience, this is a slow job.

All the news to TP workers before it goes outside—a key point in Thompson policy is illustrated in this excerpt from letter to employees. One of a series, it gave workers advance news of what was to happen in their department's post-war reorganization


WHY BONUS VARIES
During a rest period a few days later, Joe's Supervisor asked how things were going on the job.
"I hear the bonus has been down a few points the past couple of days," Joe said. "What's wrong?"
"Don't let that worry you," the Supervisor replied. "If it always ran the same, there would be something wrong."
"You mean it always varies from day to day?"
"It's almost never the same from one day to the next, but it usually averages out over a period to reflect the combined efforts of the bonus team," the Supervisor explained. "There are a lot of reasons why it varies from day to day."
WHEN I'M CHANGING I'M NORMAL!
B O N U S
"Such as?" Joe prompted.
"There are two main reasons. The first is mechanical. Material may not arrive on time. Customers may change or cancel orders. These and other conditions which cannot be controlled may interrupt the flow of work and affect bonus earnings. These are among the hazards which must be expected in an incentive plan.
30

A bonus is "just something extra that doesn't mean much" to most workers because they don't know how the plan operates. Thompson, when poll uncovered that weakness in its plan, used simple similes and quickly grasped cartoons to explain fully

WHAT THOMPSON USES TO

Thompson executives ask themselves these questions—and many others like them—then give TP workers the answers:

Are they (Thompson workers) concerned about problems of finance, engineering, manufacturing, sales? Do they know anything of these problems?

Have they been taught that employee responsibility goes hand in hand with management responsibility?

Have they been told that in the long run the company must produce more and more and sell it for less and less—if their jobs are to survive?

Have they been shown what the company is doing to reduce costs, simplify work, increase employee earnings, stabilize business, provide jobs for the future—and to spend a little less than it takes in?

Has anyone told them that customers keep demanding lower prices?

Do they know it takes $5000 in savings to create a job?

Has anyone told them that America has obtained, by producing more pieces in less time, a standard of living that 94 percent of the world's people cannot attain under any system—and that that standard can be held only by continuing to produce more pieces in less time?

area contains about 1000 people and has a personnel supervisor. He is perhaps the best direct contact management has in keeping informed on conditions and problems in the working force, but he attempts to work as far as possible through supervisors, to maintain and strengthen their position. He has the same responsibility for his territory that the personnel manager has for the plant. And he is charged with maintaining that "personal touch."

To check on the effectiveness of informataion flowing down from the top, on employee policies, and on the understanding of policy, Thompson has polled its workers. It "led with its chin" in 1944 when, using employees as judge and jury, it placed is policies on trial. Results were gratifying. Suggestions and criticism were to influence policies, but, in general, TP people liked Thompson, liked its policies, and appreciated the newspaper, handbooks, annual report, and other information services.

Plant executives keep in touch with employee opinion in another way. A series of dinners—paid for by the company—are held so that every employee meets his supervisors, other executives, and company officers across the table at least once a year. After dinner, a "board of experts" is called to a speakers' table to answer all questions TP workers can shoot at them.

Despite its close contact with employees, the company receives very little favorable comment from them. There were complaints on the incentive system before TP published "Let's See What Makes You Tick"—a booklet to explain the plan to employees. Whether employees read it and were happy about the plan, or whether they simply assumed that because the company was willing to tell all the plan must be all right, isn't known. Thompson executives haven't heard enough comment to know. They *do* know, though, that complaints about understanding the plan dropped almost to zero.

Similarly, some years ago, the installation of modern locker facilities, although it did end complaints, brought no favorable comment. So executives assume that no comment is normal.

Foremen, too, are informed—fully and in advance of general employees. They receive bulletins, for instance. usually a little more complete than those

newspaper

handbooks

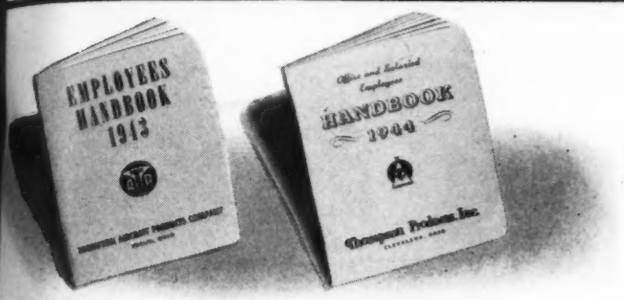
booklets on employee plans

special annual report

bulletins

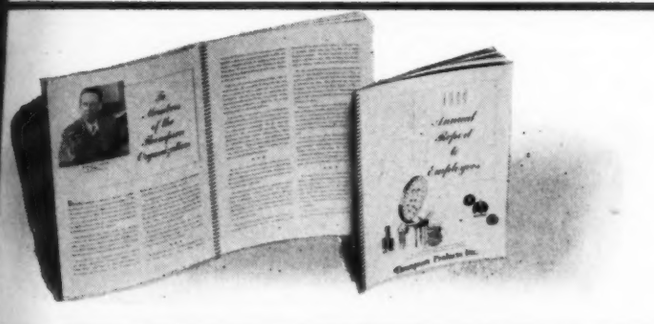
special publications

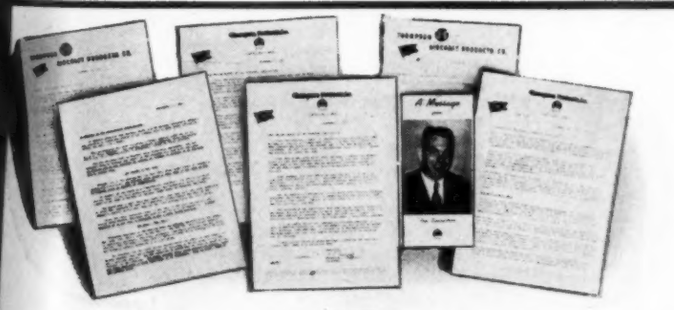
A monthly carrying company news. Written so that every TP worker understands his stake in company plans and activities. Also serves as "the voice of the employees"

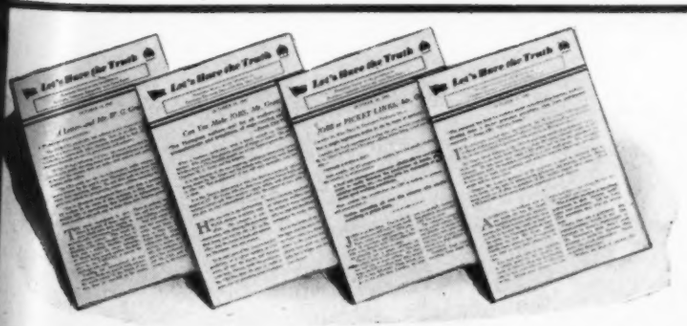


Seventy pages of text and pictures explaining policy for employees new and old. Written simply, without "don't's," handbooks are designed to settle grievances before they arise

Designed to clear up misunderstandings. For instance, "What Makes You Tick" was distributed to workers when a poll showed that they did not understand the company bonus plan



Gives employees, in simple terms, all information stockholders get. Points out TP dollar goes 95 percent to employees, 4 percent back into company, 1 percent to stockholders

To workers, foremen, and departmental groups go these frequent bulletins to explain company problems. Executives sign letters often sent to employees at their homes



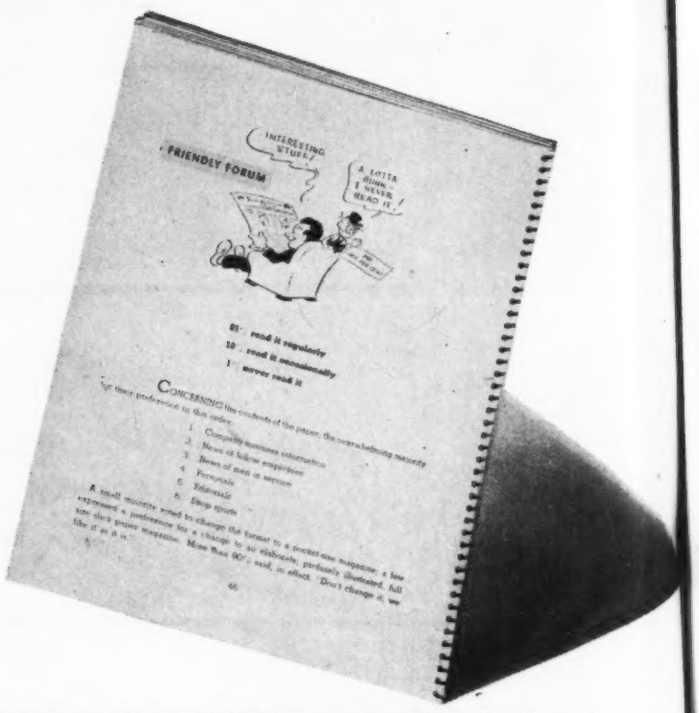
Used chiefly to offset claims made by union organizers. "Let's Have the Truth" is a four-page bulletin giving workers the facts. Issued every few days when necessary

going to workers, a few minutes before workers get theirs so they can be prepared to discuss the problem intelligently. The company believes such bulletins are one of the best means of stimulating interchange of information and are important in keeping in touch with employee opinion.

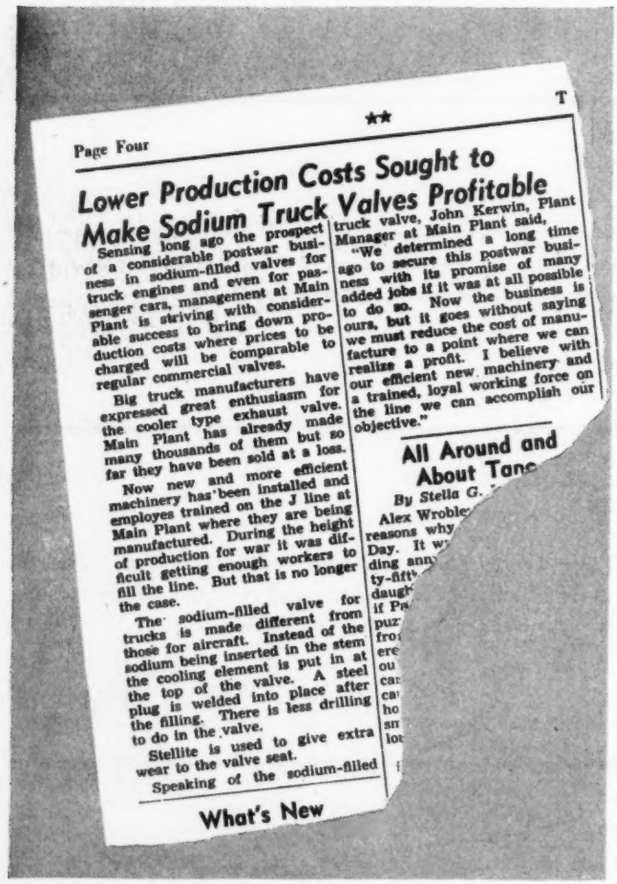
Monthly meetings are a part of the never-ending training program for supervisors. President Crawford and executives discuss all phases of company operation. Outside speakers occasionally bring foremen the latest developments in their specialties.

All of this adds up to the closest possible integration between management and men. Thompson employee policies are progressive—well above the average of all industry. Combined with the two-way communication system, the frank statement of facts, the active interchange of information, Thompson's employee policies work outstandingly well.

They pay off—for Thompson and for Thompson workers.


FRIENDLY FORUM
INTERESTING STUFF!
A LOTTA THINGS I NEVER READ IT!
01 - read it regularly
10 - read it occasionally
1 - never read it
CONCERNING the contents of the paper, the vote tabulating instantly

Two-way interchange of information, as shown in this page of report which was distributed to employees, is important Thompson policy. Poll gave Thompson accurate check on employee opinion. It's only one of several methods used to check opinion, though


Page Four ★★ T

Lower Production Costs Sought to Make Sodium Truck Valves Profitable

Sensing long ago the prospect of a considerable postwar business in sodium-filled valves for truck engines and even for passenger cars, management at Main Plant is striving with considerable success to bring down production costs where prices to be charged will be comparable to regular commercial valves.

Big truck manufacturers have expressed great enthusiasm for the cooler type exhaust valve. Main Plant has already made many thousands of them but so far they have been sold at a loss.

Now new and more efficient machinery has been installed and employes trained on the J line at Main Plant where they are being manufactured. During the height of production for war it was difficult getting enough workers to fill the line. But that is no longer the case.

The sodium-filled valve for trucks is made different from those for aircraft. Instead of the sodium being inserted in the stem the cooling element is put in at the top of the valve. A steel plug is welded into place after the filling. There is less drilling to do in the valve.

Stellite is used to give extra wear to the valve seat.

Speaking of the sodium-filled truck valve, John Kerwin, Plant Manager at Main Plant said, "We determined a long time ago to secure this postwar business with its promise of many added jobs if it was at all possible to do so. Now the business is ours, but it goes without saying we must reduce the cost of manufacture to a point where we can realize a profit. I believe with our efficient new machinery and a trained, loyal working force on the line we can accomplish our objective."

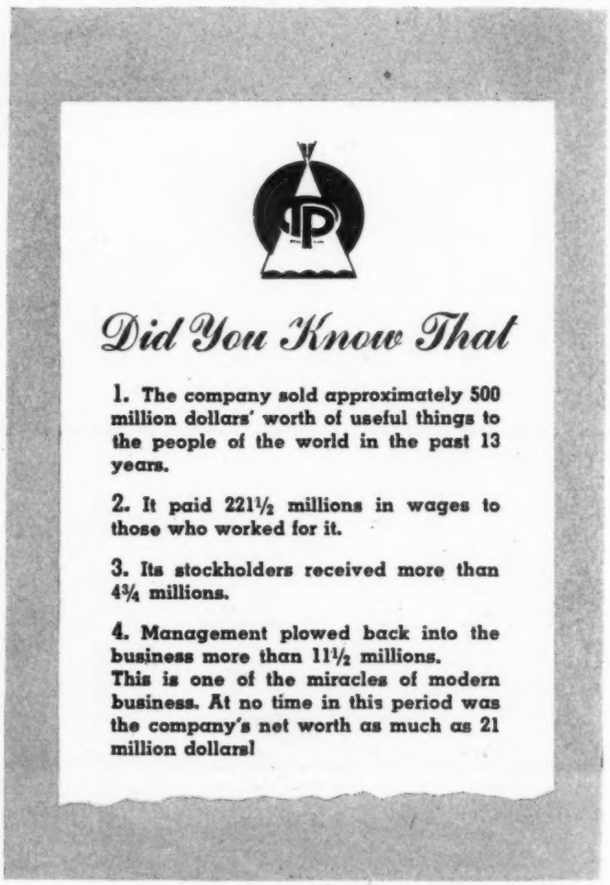
What's New

All Around and About Tanc

By Stella G.

Alex Wroble... reasons why... Day. It w... ding ann... ty-fift... daugh... if Pa... puz... fro... ere... ou... ca... ca... ho... sn... lo...

A new product, the demand for it, problems in production—and why the cost must come down. An outstanding example of management sharing its problems with workers to gain their understanding, this is routine at Thompson. Such stories spot every issue of "The Frientdly Forum"


Did You Know That

1. The company sold approximately 500 million dollars' worth of useful things to the people of the world in the past 13 years.

2. It paid 221½ millions in wages to those who worked for it.

3. Its stockholders received more than 4¾ millions.

4. Management plowed back into the business more than 11½ millions. This is one of the miracles of modern business. At no time in this period was the company's net worth as much as 21 million dollars!

One way to make nine-digit statistics talk sense to workers. Special report to employees makes ingenious use of color and cartoons to make them understand that they, not stockholders, are the ones who profit chiefly from Thompson operations

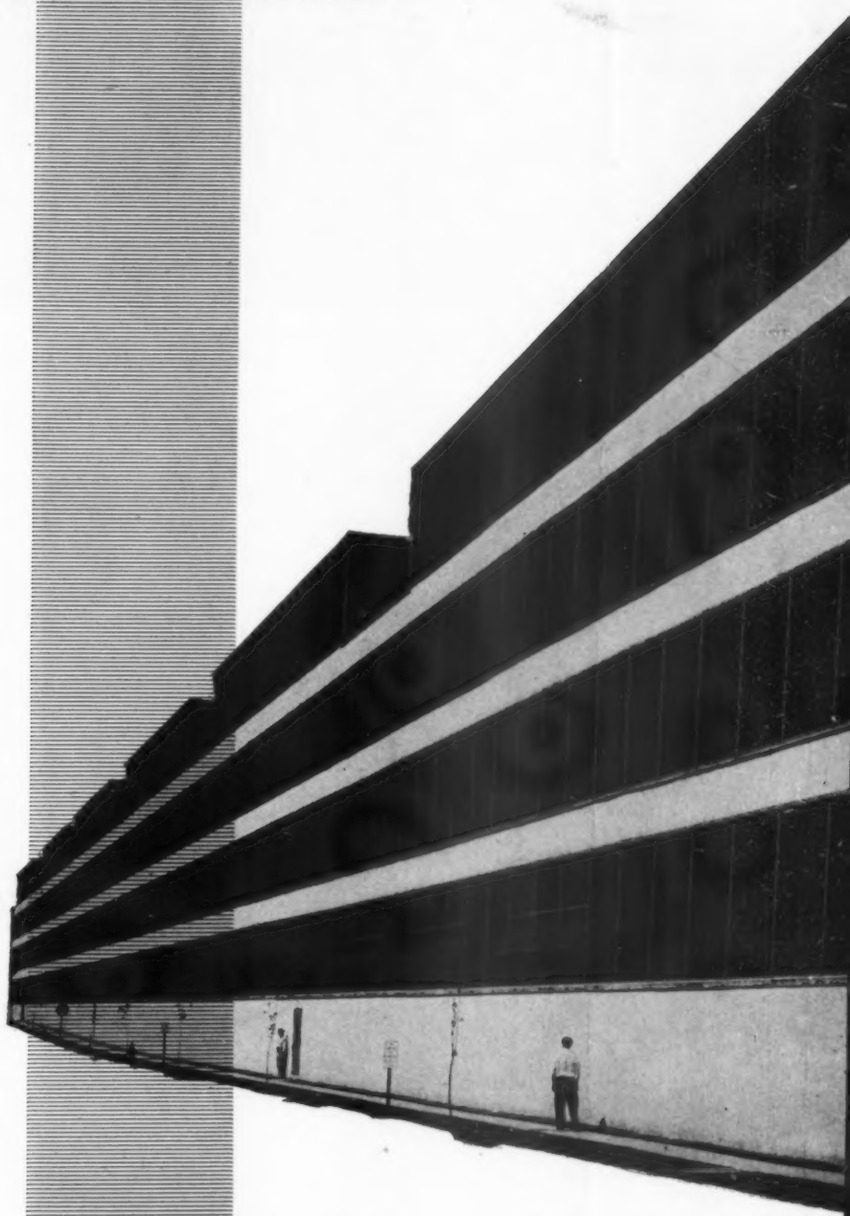
BUILDING RESTRICTIONS DICTATE BETTER UPKEEP

Government building restrictions — piled on top of serious shortages of materials — make careful maintenance of existing plant structures more important in this turbulent year of 1946 than ever before.

Builders still await clarification of the Civilian Production Administration's March order cutting to the bone all construction except veterans' housing.

Out of the present confusion one fact stands out in sharp relief. *Industry is limited in what it can spend for new construction or maintenance to $15,000 a job.* **And $15,000 won't go very far.** Beyond that, authorization is necessary — and even if authorization is forthcoming, it may take months to get it.

All this means that industry must do everything it can to make best possible use and to take best possible care of existing factory structures. To aid in setting up a program of preventive building maintenance, FACTORY therefore presents herewith the practices of representative plants that, for their special purposes and conditions, are doing the job on a better-than-average basis. To check your own program against those of other plants — and to better it — turn the page to see "How 25 Plants Handle Building Maintenance."



SURVEY OF 25 PLANTS

HOW 25 PLANTS HANDLE BUILDING

	Product	Location	Number of Main Buildings	Floor Space, Square Feet	Age of Buildings, Years	Use of Floor Area, Percent: Production	Material Storage	Office	Type of Construction	No. of Stories	Roof Covering
1	Hosiery, lingerie	Ind.	5	354,000	20	85	10	5	Reinforced concrete, mill	4	
2	Sewing machines	Ill.	3	195,000	23	80	18	2	Reinforced concrete	6	Built-up
3	Optical goods, glass	N. Y.	21	1,336,953	35	55	17.6	1.2	Reinforced concrete	5	Built-up
4	Slide fasteners, doll parts	N. J.	2	258,000	20	65	23	4	Reinforced concrete, brick	4	Pitch, gravel
5	Abrasives, machines	Mass.		1,742,400	20	75	15	10	All types	1-6	Built-up
6	Steel, bronze valves	Conn.	12	400,000	5-60	82.5	14	3.5	Brick, concrete	4	Built-up
7	Castings	Ohio	3	242,200	30	50	35	15	Concrete, brick, wood	1-3	Built-up
8	Cash registers	Ohio	27	2,461,140	34	81	10	9	Concrete, steel, brick	5	Built-up
9	Metal containers	Pa.	1	750,000	10	80	15	5	Brick	1	Asphalt slag
10	Electronic equipment	Ind.	6	633,000	10	51.2	8.6	40.2	Concrete, brick	1-4	Built-up
11	Meat products	Ind.	51	2,100,000	40				All types	1-12	All types
12	Steel, hardware, stampings	Conn.		1,000,000	50	74	20	6	All types	1-7	Built-up
13	Lenses, optical instruments	N. Y.	10	850,000	5-45	83	7	10	Reinforced concrete	4-8	Asphalt slag
14	Radio tubes	N. J.	7	140,000	30	70	20	10	Concrete, brick, wood	4	Tar and slag
15	Valves, gages	Conn.	4	450,000	20	75	15	10	Concrete, brick	6	Built-up
16	Fire extinguishers	N. J.	6	756,000	8	50	35	15	Wood, brick, steel	1	Built-up
17	Saws, files, tools	Pa.	100	1,163,400	40	70	20	10	Brick, wood, steel	1-3	Built-up
18	Silverware, bronze	R. I.		350,000	60	70	20	10	Wood	3	
19	Light metalworking	Pa.	16	290,000	21	66	10	24	Concrete, brick, wood	1-5	Asphalt slag
20	Photographic materials	N. Y.	146	16,000,000	1-50				Reinforced concrete	1-7	Built-up
21	Machine tools	Conn.	7	663,250	3-30	83	5	12	Steel, concrete, brick	1-7	Built-up
22	Office equipment	Ill.	1	123,000	5	50	25	25	Concrete	3	Built-up
23	Metal stamping	Mass.	12	200,000	30	70	10	20	Brick	1-4	Built-up
24	Furniture	Ky.	10	595,700	15-60	59.4	36.7	3.9	Steel, brick, wood	1-4	Built-up
25	Soap, toilet articles	N. J.	44	1,425,635	'42	60	34.3	5.7	Concrete, brick, wood	1-10	Built-up

A recent survey of 25 representative industrial plants shows that only 72.5 percent have definite schedules for the inspection of certain important elements of plant buildings, and such general service equipment as piping, lighting, and heating systems.

This should not be taken to mean that the remaining 27.5 percent do not inspect their buildings and service equipment, but it is fair to assume that such inspections are not made on planned schedules.

To find out how building maintenance is handled

MAINTENANCE

DESCRIPTION OF PLANTS FACTORY SURVEYED

ANALYSIS OF BUILDING MAINTENANCE PRACTI

PREDOMINANT TYPES OF CONSTRUCTION

NUMBER OF MAINTENANCE MEN

FREQ

Floors	Sidewalls	Sash	Lighting	Ventilation	Air Conditioning, Extent	No. of Elevators	Carpenters	Plumbers	Inspection	Painters	Masons	Electricians	Laborers	Other	Foundations, Columns, Girders, Beams	Floors	Stairways	Sidewalls, Exterior	Sidewalls, Interior	S D
Wood	Concrete	Steel	Fluorescent	Fans	None	6	4	2	1			4	6		6 months	Monthly	Weekly	6 months	6 months	6 m
Concrete, wood	Brick	Steel, wood	Filament, fluorescent	Mechanical	Exec. offices	3	7	2		1		10	10		Yearly	Monthly	Yearly	Yearly	Monthly	Mo
Wood, concrete	Brick	Steel, wood	Filament, fluorescent	Fans, blowers	61,000 sq. ft.	15	42	29		25		41	108	24	No routine	No routine	No routine	No routine	No routine	Co on
Concrete	Concrete, brick	Steel	Fluorescent	Blower	Entire plant	4	½	½	1	2		1	2	2	Yearly	Monthly	Monthly	Monthly	Monthly	Mo
Concrete, wood	Brick, wood	Steel, wood	Filament, fluorescent	Dust exhaust	Small	25	30	22	15	21	12	31	95		Yearly	Monthly	Monthly	Yearly	Yearly	Mo
Wood	Brick	Steel, wood	Fluorescent	Natural, mechanical	None	11	6	8		10	3	6	25		Yearly	Weekly	Weekly	Yearly	Yearly	Mo
Concrete	Concrete, brick	Steel	Fluorescent	Fans	None	5	12	1			3	25	6	35	Monthly	No routine	No routine	No routine	No routine	No
Wood	Brick	Steel, wood	Fluorescent	Natural	Small	36	62	36	157	30	1	74	28	49	No routine	Occupancy change	No routine	No routine	No routine	No
Concrete	Brick	Steel	Filament, fluorescent	Fans	Small	4	5	2		2	1	2	4		No routine	No routine	No routine	No routine	No routine	Ye
Wood block	Brick	Steel	Filament, fluorescent	Natural	None	2	8	2	2	4		20	45	10	Yearly	Weekly	Weekly	Yearly	Monthly	Mo
Concrete, wood, brick	Concrete, brick	Steel	Filament, fluorescent	Fans, blowers	Offices	21	11	18		9	2	14	10	6	No routine	No routine	No routine	No routine	No routine	No
Concrete, wood	Brick, wood, concrete	Steel, wood	Filament, fluorescent	Fans	None	13	30	10	2	8	2	20	12	10	No routine	No routine	No routine	No routine	No routine	No
Reinforced concrete	Reinforced concrete	Steel, wood, glass block	Filament, fluorescent	Unit and central stack systems	35%	15	12	20		6	2	37	1	6	Rarely	Continuous	Continuous	Continuous	Continuous	Co
Wood	Brick	Steel, wood		Fans	Small	3	4	4		1		6		19	Yearly	No routine	Monthly	Yearly	Yearly	Mo
Concrete, wood	Concrete, brick	Steel, wood	Filament, fluorescent	Fans, ducts	Small	6	4	5		1	1	8	2	32	Yearly	Monthly	Weekly	Yearly	Yearly	Mo
Concrete, wood block	Brick	Steel, wood	Filament, fluorescent	Natural	Offices	3	5	6	2		2	8	3	10	Yearly	No routine	No routine	Yearly	Yearly	6 m
Concrete, wood	Brick, corrugated iron	Wood, steel	Filament, fluorescent	Natural	None	16	15	10	6	6	7	15	40		Yearly	Yearly	Yearly	Yearly	Yearly	Mo
Wood	Brick	Wood	Filament, fluorescent			6	1	2		2		2	4		No routine	No routine	No routine	No routine	No routine	No
Flat slab	Brick, cinder block	Steel, wood	Filament, fluorescent	Natural	Small	3	4	2	2	4	2	15		38	Yearly	6 months	Monthly	6 months	6 months	Mo
Concrete	Concrete, tile, brick	Steel	All types	All types	Extensive	178	60	300		80	25	150	200	400	Yearly	Yearly	Yearly	Yearly	Yearly	Ye
Wood block, asphalt	Brick	Steel, wood	Filament, fluorescent	Fans	Small	9	12	15	3	6	3	20	40		Yearly	Weekly	Weekly	Yearly	Monthly	We
Reinforced concrete	Brick	Steel	Fluorescent		30%	3	2	1		2		2	4	2	Yearly	Yearly	Yearly	Yearly	Yearly	Mo
Wood, concrete			Filament, fluorecsent	Natural	None	5	6	3		4	1	4	6	4		Monthly	Yearly	Yearly	Yearly	Ye
Wood, concrete	Brick	Steel, wood	Fluorescent	Fans, exhaust system	Offices	7	4	3		2		7	2		Yearly	3 months	3 months	Yearly	Yearly	6 m
Concrete, wood	Concrete, brick	Steel, wood	Filament, fluorescent	Natural	None	22	23	30		7	3	15	12		Yearly	Yearly	Yearly	Yearly	Yearly	Ye

by widely separated plants, the practices of 25 plants in 10 different states were studied. These plants represent 21 kinds of products. The number of buildings comprising each plant ranges from 1 to 146. In age the buildings range from 5 to 60 years old. Area of floor space varies from 123,000 to 2,461,140 square feet.

The frequency of inspecting the building elements and service equipment mentioned previously may be summarized as follows:

Foundations, colum plants covered, 17 ins yearly. One plant sched tion, whereas in anot 6-month intervals.

MAINTENANCE

DESCRIPTION OF PLANTS FACTORY SURVEYED

ANALYSIS OF BUILDING

PREDOMINANT TYPES OF CONSTRUCTION							NUMBER OF MAINTENANCE MEN									
Floors	Sidewalls	Sash	Lighting	Ventilation	Air Conditioning, Extent	No. of Elevators	Carpenters	Plumbers	Inspection	Painters	Masons	Electricians	Laborers	Other	Foundations, Columns, Girders, Beams	Floors
Wood	Concrete	Steel	Fluorescent	Fans	None	6	4	2	1			4	6		6 months	Monthly
Concrete, wood	Brick	Steel, wood	Filament, fluorescent	Mechanical	Exec. offices	3	7	2		1		10	10		Yearly	Monthly
Wood, concrete	Brick	Steel, wood	Filament, fluorescent	Fans, blowers	61,000 sq. ft.	15	42	29		25		41	108	24	No routine	No routine
Concrete	Concrete, brick	Steel	Fluorescent	Blower	Entire plant	4	½	½	1	2		1	2	2	Yearly	Monthly
Concrete, wood	Brick, wood	Steel, wood	Filament, fluorescent	Dust exhaust	Small	25	30	22	15	21	12	31	95		Yearly	Monthly
Wood	Brick	Steel, wood	Fluorescent	Natural, mechanical	None	11	6	8		10	3	6	25		Yearly	Weekly
Concrete	Concrete, brick	Steel	Fluorescent	Fans	None	5	12	1			3	25	6	35	Monthly	No routine
Wood	Brick	Steel, wood	Fluorescent	Natural	Small	36	62	36	157	30	1	74	28	49	No routine	Occupancy change
Concrete	Brick	Steel	Filament, fluorescent	Fans	Small	4	5	2		2	1	2	4		No routine	No routine
Wood block	Brick	Steel	Filament, fluorescent	Natural	None	2	8	2	2	4		20	45	10	Yearly	Weekly
Concrete, wood, brick	Concrete, brick	Steel	Filament, fluorescent	Fans, blowers	Offices	21	11	18		9	2	14	10	6	No routine	No routine
Concrete, wood	Brick, wood, concrete	Steel, wood	Filament, fluorescent	Fans	None	13	30	10	2	8	2	20	12	10	No routine	No routine
Reinforced concrete	Reinforced concrete	Steel, wood, glass block	Filament, fluorescent	Unit and central stack systems	35%	15	13	20		6	2	37	1	6	Rarely	Continuous
Wood	Brick	Steel, wood		Fans	Small	3	4	4		1		6		19	Yearly	No routine
Concrete, wood	Concrete, brick	Steel, wood	Filament, fluorescent	Fans, ducts	Small	6	4	5		1	1	8	2	32	Yearly	Monthly
Concrete, wood block	Brick	Steel, wood	Filament, fluorescent	Natural	Offices	3	5	6	2		2	8	3	10	Yearly	No routine
Concrete, wood	Brick, corrugated iron	Wood, steel	Filament, fluorescent	Natural	None	16	15	10	6	6	7	15	40		Yearly	Yearly
Wood	Brick	Wood	Filament, fluorescent			6	1	2		2		2	4		No routine	No routine
Flat slab	Brick, cinder block	Steel, wood	Filament, fluorescent	Natural	Small	3	4	2	2	4	2	15		38	Yearly	6 months
Concrete	Concrete, tile, brick	Steel	All types	All types	Extensive	178	60	300		80	25	150	200	400	Yearly	Yearly
Wood block, asphalt	Brick	Steel, wood	Filament, fluorescent	Fans	Small	9	12	15	3	6	3	20	40		Yearly	Weekly
Reinforced concrete	Brick	Steel	Fluorescent		30%	3	2	1		2		2	4	2	Yearly	Yearly
Wood, concrete			Filament, fluorecsent	Natural	None	5	6	3		4	1	4	6	4		Monthly
Wood, concrete	Brick	Steel, wood	Fluorescent	Fans, exhaust system	Offices	7	4	3		2		7	2		Yearly	3 months
Concrete, wood	Concrete, brick	Steel, wood	Filament, fluorescent	Natural	None	22	23	30		7	3	15	12		Yearly	Yearly

by widely separated plants, the practices of 25 plants in 10 different states were studied. These plants represent 21 kinds of products. The number of buildings comprising each plant ranges from 1 to 146. In age the buildings range from 5 to 60 years old. Area of floor space varies from 123,000 to 2,461,140 square feet.

The frequency of inspecting the building elements and service equipment mentioned previously may be summarized as follows:

BUILDING MAINTENANCE PRACTICES IN USE IN THESE PLANTS

FREQUENCY OF INSPECTION													Inspection Made by		Use of Check List for Inspection		Study of Defects for Preventive Measures	
ndations, lumns, rders, eams	Floors	Stairways	Sidewalls, Exterior	Sidewalls, Interior	Sash, Doors	Roof Covering	Roof Supports, Penthouses	Fire Escapes	Platforms	Service Piping	Lighting System	Heating System	Plant Force	Outside Organizations	Yes	No	Yes	
months	Monthly	Weekly	6 months	6 months	6 months	3 months	3 months	3 months		3 months	Weekly	Monthly	✓		✓		✓	1
arly	Monthly	Yearly	Yearly	Monthly	Monthly	Yearly	Yearly	Monthly	Monthly	Monthly	Weekly	Monthly	✓		✓		✓	2
routine	No routine	No routine	No routine	No routine	Continuous on cords	Continuous	Continuous	Yearly		Weekly	No routine	Weekly	✓		✓		✓	3
arly	Monthly	Monthly	Monthly	Monthly	Monthly	Weekly	Monthly	Monthly	Weekly	Weekly	Monthly	Weekly-3 months	✓		✓		✓	4
arly	Monthly	Monthly	Yearly	Yearly	Monthly	Yearly	Yearly	Yearly	Monthly	Weekly	Weekly	Weekly	✓			✓	✓	5
arly	Weekly	Weekly	Yearly	Yearly	Monthly	Weekly	Weekly	Weekly	Monthly	Monthly	Monthly	Weekly	✓		✓		✓	6
nthly	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	✓		✓		✓	7
routine	Occupancy change	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	3-4 months	Daily	✓			✓	✓	8
routine	No routine	No routine	No routine	No routine	Yearly	No routine	No routine	No routine	No routine	No routine	Yearly	Yearly						9
rly	Weekly	Weekly	Yearly	Monthly	Monthly	4 months	4 months	Weekly	Monthly	No routine	Weekly	Weekly	✓			✓	✓	10
routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	✓			✓	✓	11
routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	✓	✓		✓	✓	12
ely	Continuous	Continuous	Continuous	Continuous	Continuous	Yearly	Yearly	Weekly		Yearly	3 months	Yearly	✓				✓	13
rly	No routine	Monthly	Yearly	Yearly	Monthly	Yearly	Yearly	Yearly		Monthly	Weekly	Monthly	✓			✓	✓	14
rly	Monthly	Weekly	Yearly	Yearly	Monthly	6 months	6 months	6 months	Monthly	3 months	Monthly	6 months	✓		✓		✓	15
rly	No routine	No routine	Yearly	Yearly	6 months			Yearly		Weekly	6 months	Weekly	✓	✓	✓		✓	16
rly	Yearly	Yearly	Yearly	Yearly	Monthly	6 months		Yearly		Monthly	Weekly	Monthly	✓			✓	✓	17
routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	No routine	✓		✓			18
rly	6 months	Monthly	6 months	6 months	Monthly	3 months	Yearly	Monthly	6 months	Monthly	Weekly	6 months	✓	✓		✓	✓	19
rly	Yearly	Yearly	Yearly	Yearly	Yearly	6 months	6 months	Yearly	6 months	Monthly	No routine	Monthly	✓		✓		✓	20
rly	Weekly	Weekly	Yearly	Monthly	Weekly	Yearly	Monthly	Monthly,	Weekly	Constant	Constant	Constant	✓			✓	✓	21
rly	Yearly	Yearly	Yearly	Yearly	Monthly	Monthly	Monthly		Yearly	Weekly	Monthly	Weekly	✓		✓		✓	22
	Monthly	Yearly	Yearly	Yearly	Yearly							Yearly		✓		✓	✓	23
rly	3 months	3 months	Yearly	Yearly	6 months	3 months	3 months	Monthly	Yearly	3 months	Weekly	Monthly	✓	✓	✓		✓	24
rly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Frequently	Frequently	Frequently	✓		✓		✓	25

Foundations, columns, girders, beams. Of the 25 plants covered, 17 inspect regularly and 15 do so yearly. One plant schedule calls for a monthly inspection, whereas in another inspections are made at 6-month intervals.

Floors. In 16 of the 25 plants, 64 percent, the floors are inspected regularly. In 6 they are inspected monthly; yearly in 5 other plants. A weekly inspection is made in 3 plants. One plant inspects floors every 3 months, and another every 6 months.

Stairways. Seventeen, 68 percent, inspect regularly. Six do so yearly; 5, weekly; 4, monthly; 1 inspects every 3 months; 1 reports continuous inspection.

Sidewalls, exterior. In 18 plants, 72 percent, these parts are inspected regularly. In the majority of plants, 14, inspections are made yearly. One plant inspects monthly; 2 report inspection every 6 months; 1 reports continuous inspection.

Sidewalls, interior. Eleven out of 18 plants report a yearly inspection. Four inspect monthly; 2, every 6 months. One maintains continuous inspection.

Sash and Doors. Twenty plants report regular inspection, 10 doing so on a monthly basis. One plant inspects weekly; 3 plants inspect every 6 months; 4, yearly; 2, continuously.

Roof Covering. Opinion on suitable intervals between inspections of this important element seem to vary rather widely. Six out of 22 plants report no regular examination. Of the remaining 16, 1 inspects weekly; 1, monthly; 1, every 4 months; 3, every 3 months; 3, every 6 months; 6, yearly; 1, continuously.

Roof Supports and Penthouses. Inspection of these parts follows the same general pattern. Again, 16 out of 22 plants report definitely scheduled inspections. One plant inspects weekly; 3, monthly; 2, every 3 months; 1, every 4 months; 2, every 6 months; 6, yearly; 1, continuously.

Fire Escapes. Of 23 plants reporting, 17 inspect regularly — 3, weekly; 5, monthly; 1, every 3 months; 1, every 6 months; and 7, yearly.

Platforms. Only 12 out of 18 plants reported a regular inspection schedule for platforms. In 2 plants they are inspected weekly, while 5 inspect them monthly. Inspection every 6 months is considered sufficient in 2 plants; 3 make an inspection yearly.

Service Piping. As might be expected, more attention is paid to service lines carrying water, compressed air, steam, and gas. Seventeen out of 24 plants, 70.8 percent, schedule inspection of these lines. Of this number, 5 inspect weekly; 6, monthly; 3, every 3 months; 1, yearly. One plant reports continuous inspection; another frequent inspection.

Lighting System. Regular inspections are made in 18 out of 24 plants, 75 percent. Eight plants inspect the lighting system weekly; 4 inspect it monthly; 2 go over it every 3 months. One inspects every 6 months; and 1, yearly. Of the remaining 2 plants, 1 makes continuous inspections, 1 inspects frequently.

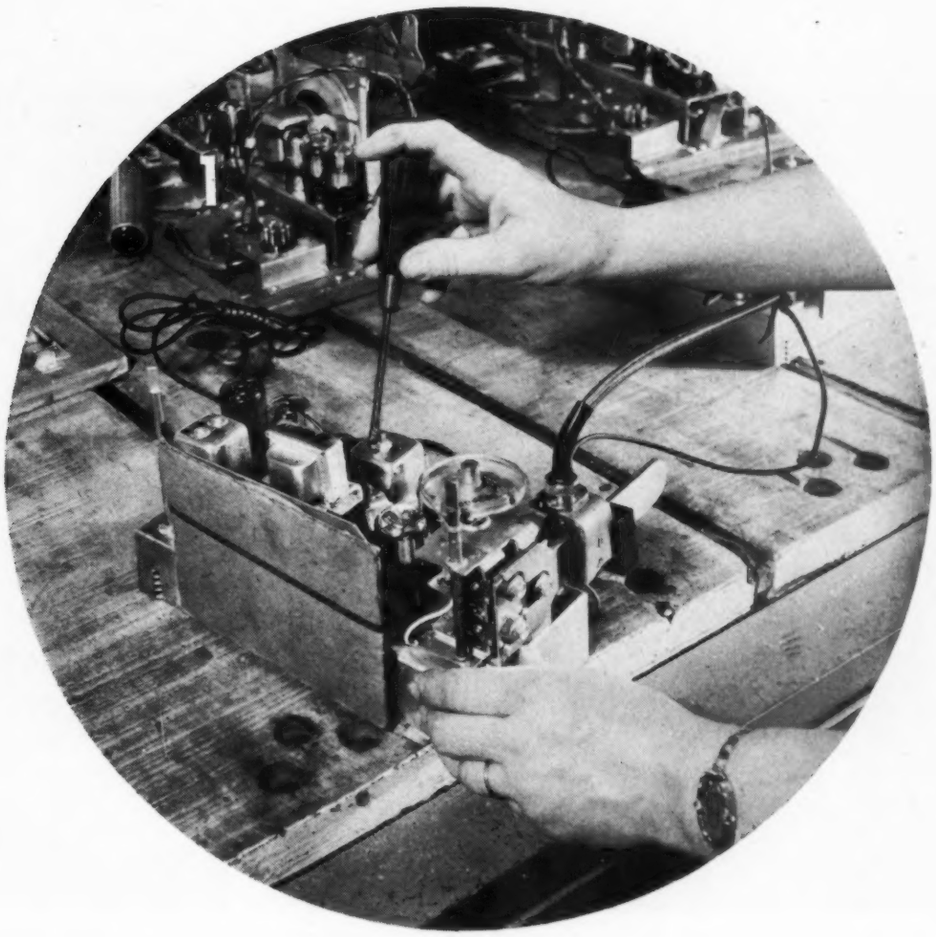
Heating System. Whatever the type of heating system used, it receives more attention than any of the other items listed here. This is made evident by the fact that 21 out of the 25 plants reporting, 84 percent, have definite inspection schedules. Although only 1 plant inspects the heating system daily; 7 do so weekly; and 6 make a monthly inspection. Two plants report that they make inspections every 6 months; 3, every year; 1, frequently; 1 continuously.

In 23 out of 24 plants inspections are made by 1 or more of the plant men. Five of the 23 plants also have inspections made by some outside organization. One plant has all inspections made by an outside organization.

Check lists are used, when making inspections, by 13 plants. Two do not use a check list, while 2 fail to report their practice in this respect.

In 23 plants defects in buildings and service equipment are studied to determine causes and work out suitable preventive measures.

Comments indicate that in 5 plants floors constitute the most serious problem in building maintenance, while roofs hold that place in 3 plants. Air conditioning and heating equipment is mentioned once as posing the most serious problem, while roof and skylight glass, age of buildings, and corrosion of structural elements also receive one mention each.



WORK-SAVERS THAT ADD UP TO LOW-COST PRODUCTION

Reconversion to civilian radio production at the Philco Corporation, Philadelphia, is being accelerated by the application of simplified work procedures like those shown here. Out of the files of L. Marcon, methods engineer, they are examples of what happens when a work simplification program sets everyone in the organization to searching for the "one best way" to do each job. No colossal money-saver in the entire collection. But add them all together and they contribute to more efficient operation and better production.

THREE JOBS ARE DONE AT ONCE THROUGH THE USE OF TEST JIG SHOWN IN PHOTOGRAPH ABOVE

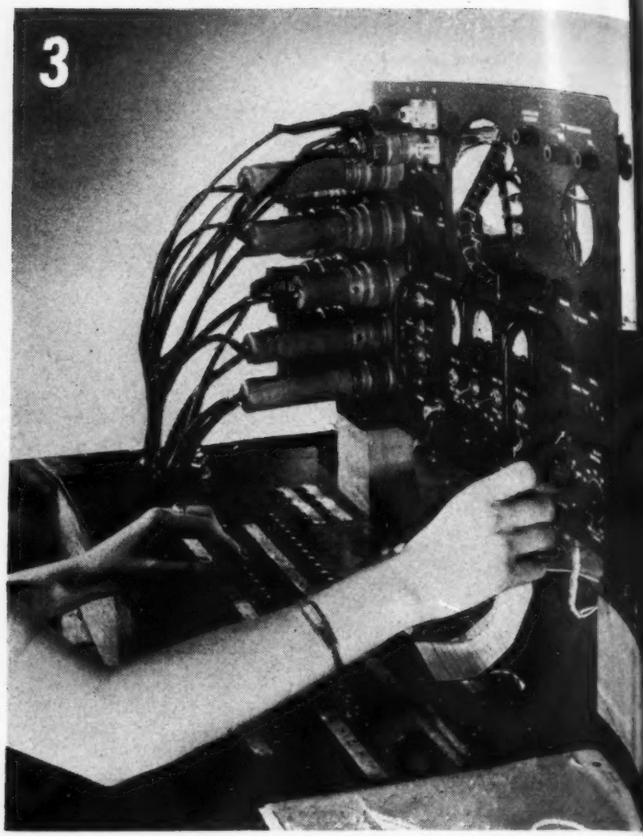
SEVERAL TEST LEADS have to be clipped in place for padding or tuning the IF (intermediate frequency) section of a table radio receiver chassis. Formerly the operator was obliged to clip in place three separate test leads at the appropriate test points on the receiver. After this was done, she could begin the testing operation. Not only was it a slow operation to clip the leads in position, but also it was easy to put leads in the wrong place, or leads might touch each other, cause a short circuit and damage the set or make readings valueless.

A test jig now makes it possible for the operator to connect the radio for padding (tuning) the IF section in a single operation. In other words, one jig, especially designed for this operation, makes all three contacts formerly made by three test clips which had to be positioned separately.

A much better and safer electrical contact is made, and testing time has been reduced about 25 percent. This means that the speed of the conveyor can be maintained at a higher rate, production is increased; and the fatigue formerly experienced by the operator is notably reduced.

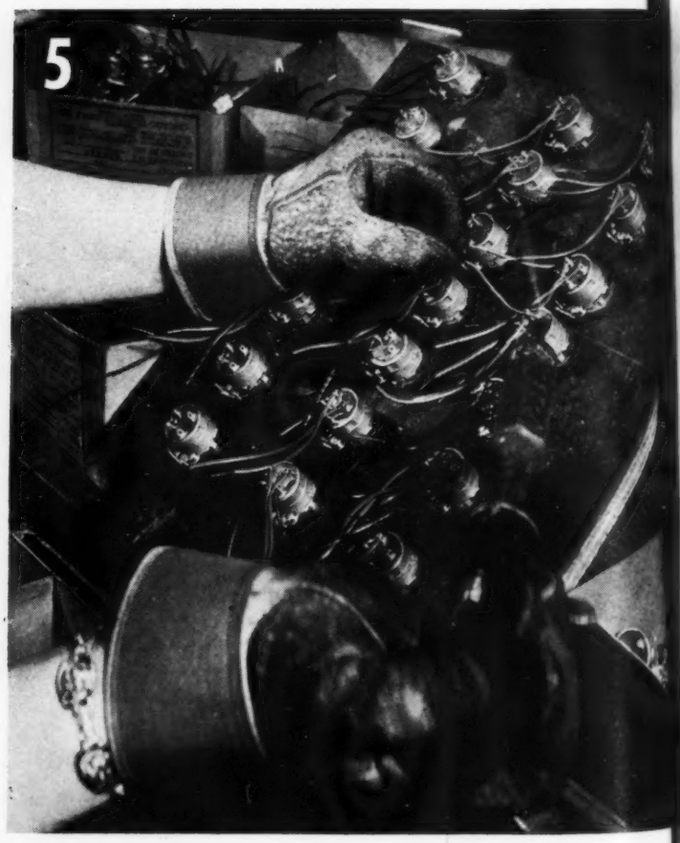
CONTINUED ON NEXT PAGE

ONE POWER TOOL DOES TWO JOBS ON NUT AND BOLT ASSEMBLY



"PINBALL" TESTER SAVES THOUSANDS OF MAN-HOURS WEEKLY

TUBES ARE POSITIONED AT WORKPLACE TO FACILITATE ASSEMBLY



JIG SAVES APPROXIMATELY 25 PERCENT IN PRODUCTION TIME

2 GIRL OPERATES a pre-positioned air tool which is designed to pick up self-threading, self-locking nuts, and also put them on the threaded bolts on the chassis of a radio receiver. Before the air tool was used, this assembly operation required considerably more time. It was necessary to pick up each nut manually, put it in position, and fasten it to the bolt. These operations required twice as much work. The present system cuts assembly time 50 percent, reduces operator fatigue.

3 SPECIAL TESTING DEVICE makes testing electrical circuits easier and quicker. It uses flashing lights, like a pinball machine, to show if there are any breaks or short-circuits in wiring or contacts, and has saved thousands of man-hours each week in the inspection and testing of receiver-indicator units of radar bombsights.

Before the "pinball" test was devised, it was necessary to clip leads from a meter to a large number of continuity test points. These tests could be made to only two terminals at a time, and thus there were as many as 125 separate continuity test operations. With the continuity tester, it is possible to make all these tests in a single operation, by merely pushing buttons and observing panel lights, which show whether the continuity is satisfactory. Both time and operator fatigue are saved, and it is possible to assemble and test complex radar equipment on a semi-continuous moving conveyor line.

4 PLACING MINIATURE TUBES and tubes of standard size in the chassis of a portable radio set is one of the final assembly operations. Here the work is speeded by having tubes, in their original containers, placed in racks just above the conveyor belt.

Work is simplified because there is no need for unpacking tubes from the cartons in which they are delivered from the tube manufacturers. Also, breakage is reduced, and handling time is saved. Tube cartons are arranged in the racks in such a way that operators find it easy to place them in the correct sockets of the radio receiver.

5 VOLUME CONTROL, which is a subassembly used in the portable (a.c., d.c. battery) radio, was formerly assembled by the operator on a table directly across from the moving conveyor belt. With no jig to hold the subassembly in place, attaching the wire leads to volume controls and then soldering them in place was a slow, laborious, and fatiguing operation.

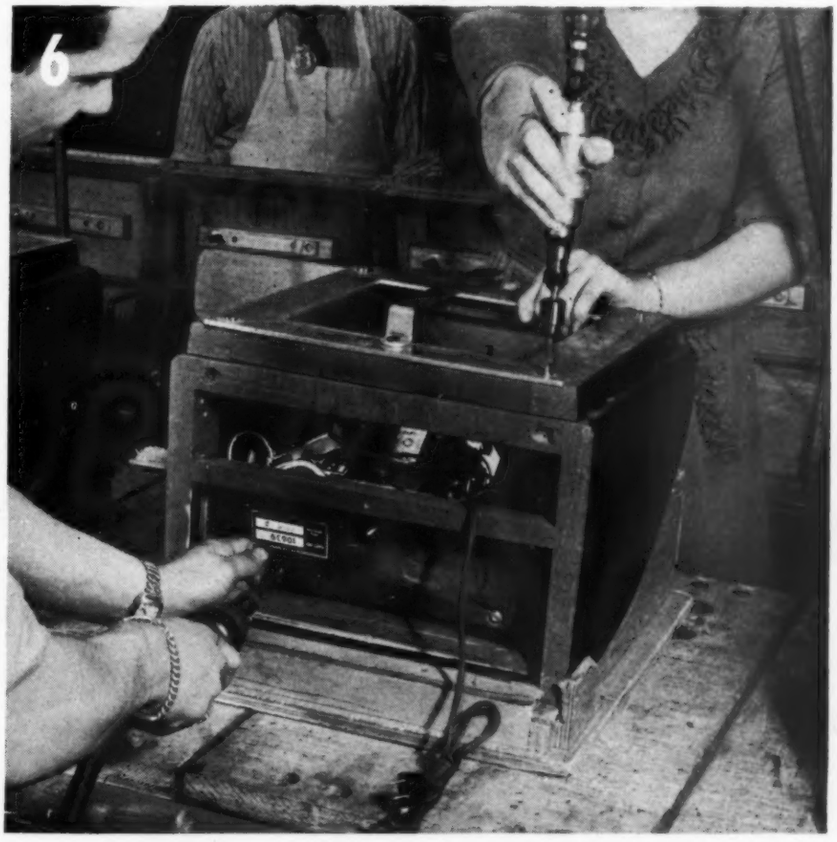
Volume control subassemblies are now put together on a special jig, which consists of a board with holes drilled to the proper size for holding volume controls securely in position. With a number of controls placed in this jig, the assembler can do a mass production assembly operation in miniature. That is, she first attaches the leads to a given terminal post on each volume control, then attaches all leads to the next terminal post, and continues until each volume control is completely wired. Then she solders the leads in position with a minimum of time and labor. Utilizing a jig in this manner not only saves about 25 percent in production time, but it reduces operator fatigue by at least 15 percent.

Also the jig permits full advantage to be taken of having the subassembly work done directly across from the moving conveyor, where receivers are being assembled. In other words, bins of volume control subassemblies, when completed, can be fed across the belt into the receiver assembly line.

6 HERE TWO OPERATIONS are performed on a radio-phonograph by two operators working simultaneously. The girl standing at the right utilizes a special metal jig shown above the cabinet to spot, before mounting, screw holes to be drilled in the four corners of the cabinet. Use of the jig saves 25 percent in time, increases the accuracy in placing and drilling holes, and reduces fatigue.

At the same time, the man at the left is putting in two screws by means of an air gun. Using this power tool, he can complete this operation and check other parts of the assembly chassis while the girl is drilling the mounting holes. Note the curved wooden holding jig on which the radio-phonograph is held during these and other assembly operations.

By having two operators do these separate operations simultaneously, conveyor speed can be maintained at a faster rate, thus increasing production proportionately.



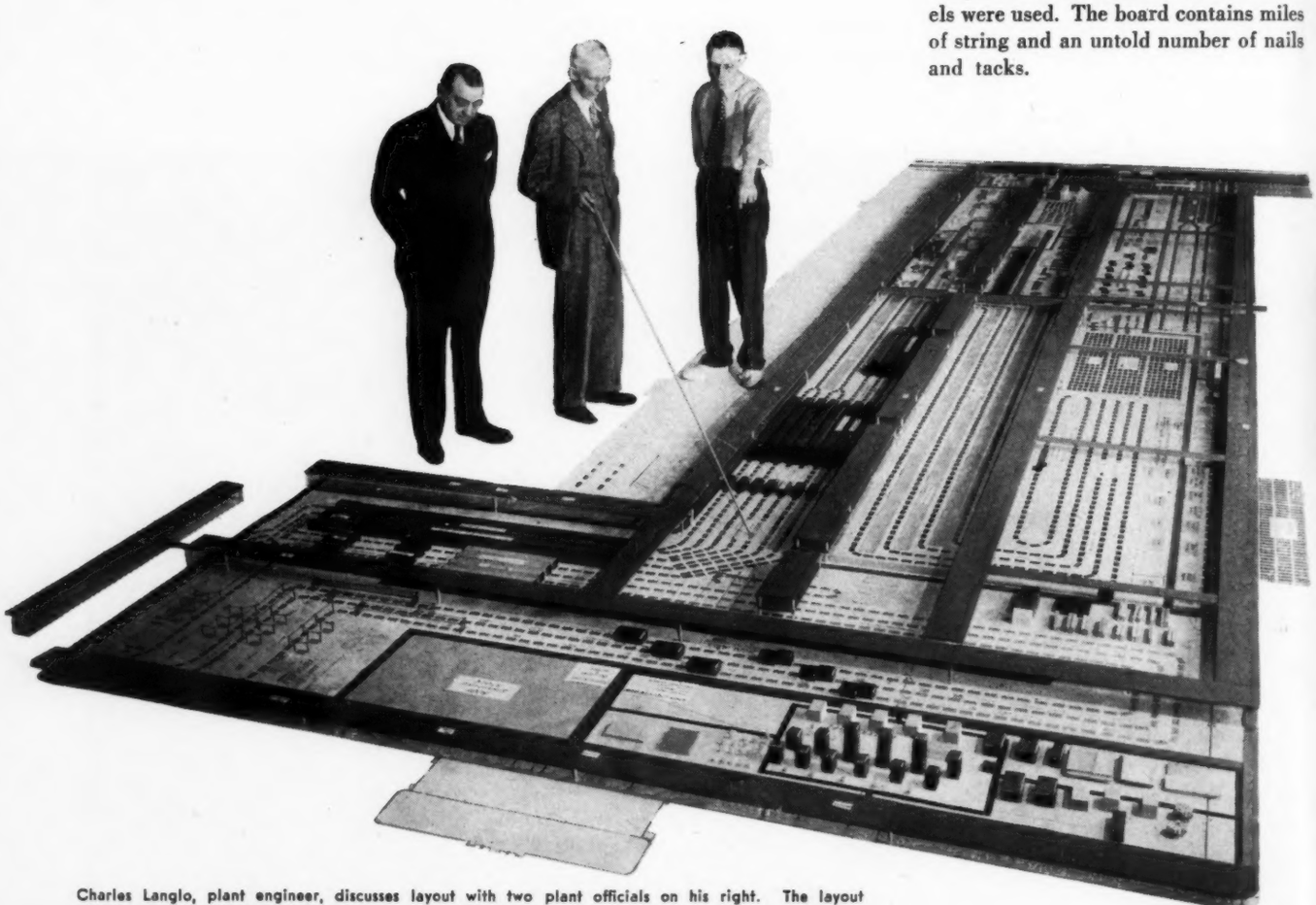
DOUBLE-HEADER ASSEMBLY HELPS KEEP WORK ON THE MOVE

SCALE MODEL SPEEDS KAISER-FRAZER CONVERSION

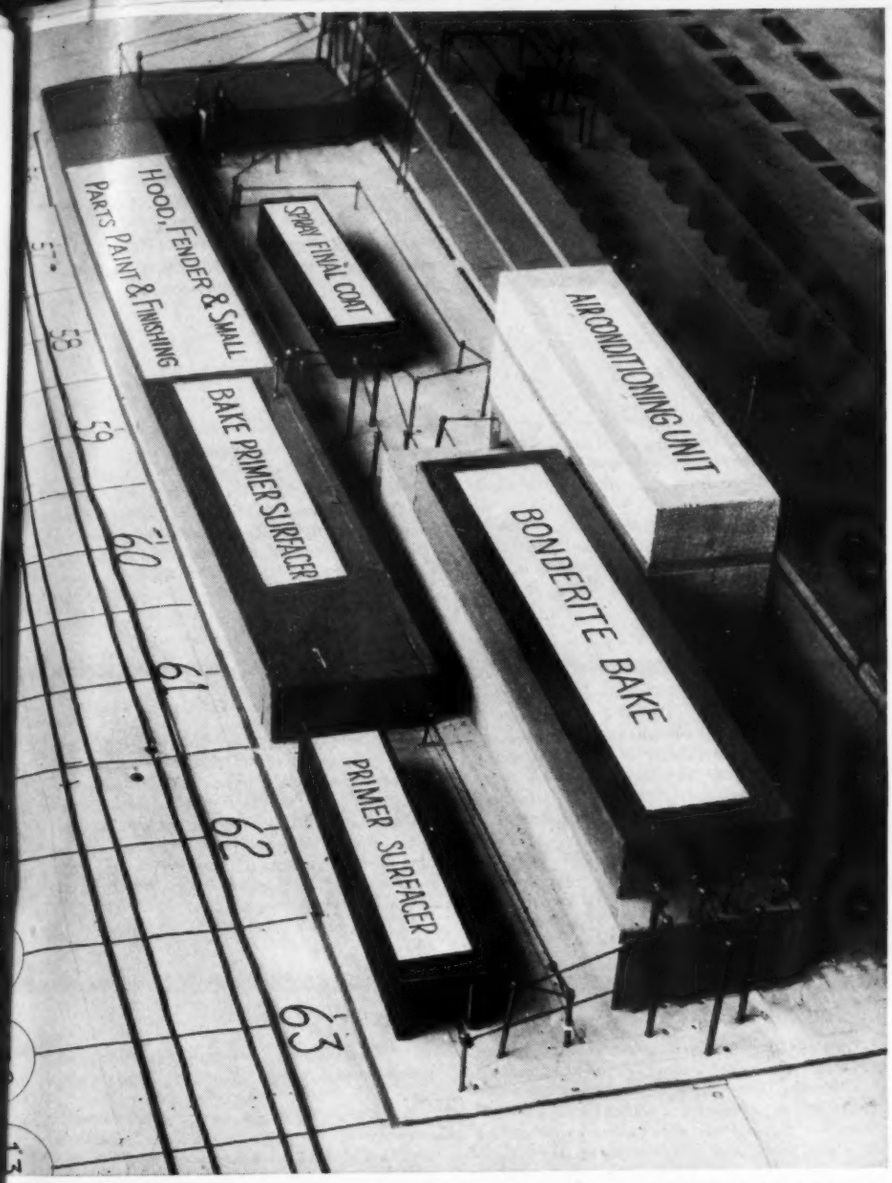
Three-dimensional, seven-color plant layout has been Kaiser-Frazer Corporation's most useful tool in planning complete manufacturing facilities at Willow Run, Mich. To its successful use may be attributed the accomplishment of such basic objectives as: (1) Continuous production line, (2) minimum handling, (3) low operating cost, (4) high operator efficiency, and (5) protection for materials.

Willow Run's 3,345,000 square feet of space, used during the war for B-24 bomber production, will house production estimated at 1500 cars per day, also farm equipment. A car mock-up was the only gage engineers had to work with. Rough layouts were first made—right on the model. Pencil markings on the board were then followed for construction and placement of models and templets.

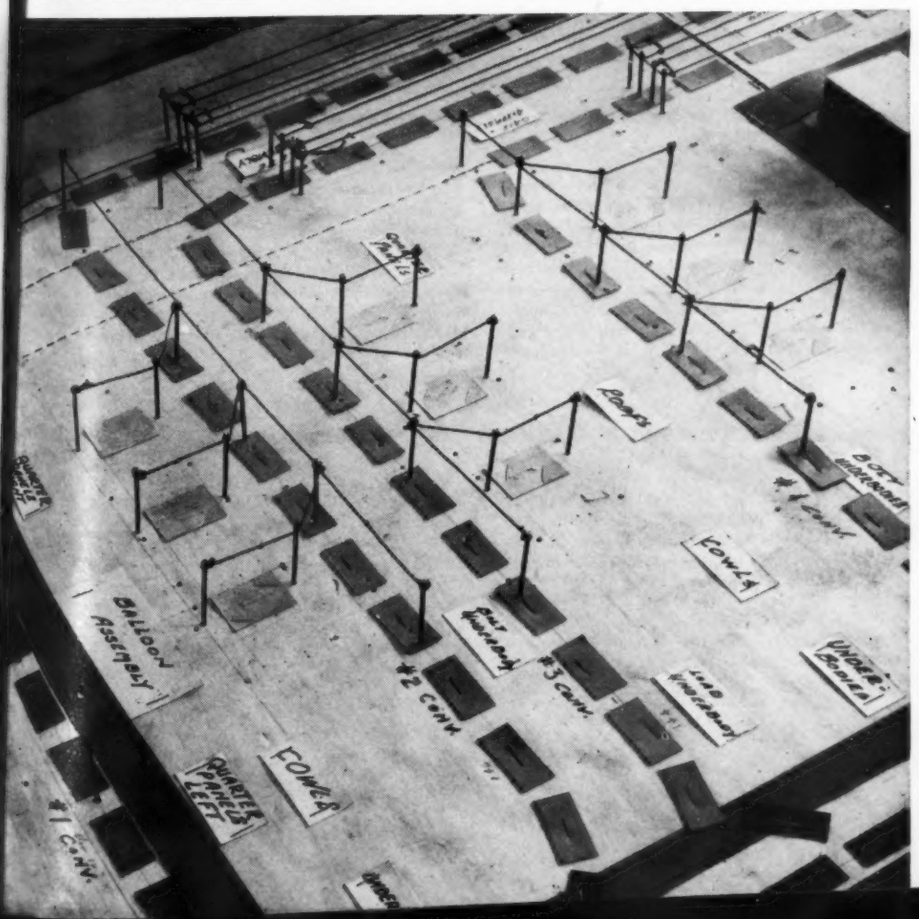
The final scale model, extensive in detail as it is, is not elaborate in any sense of the word. Two men completed it in less than 30 days. More than 5600 templets and 500 dummy wooden models were used. The board contains miles of string and an untold number of nails and tacks.



Charles Langlo, plant engineer, discusses layout with two plant officials on his right. The layout board is constructed of ¾-in. plywood on supports 3 feet from the floor. Steps are conveniently located so that conferences can be held on the layout board; it will hold the weight of approximately 20 men. The board is 18x36 feet, built to the scale of ⅛ inch to 1 foot. Layout represents world's largest automobile manufacturing plant on one floor, under one roof. Dimensions: 3121 x 1200 feet



Models made of balsa wood represent conveyors, ovens, machinery, buildings, ramps, stock cribs—all the equipment and structural parts that are required in production processes. No attempt was made to fashion models to actual contours of the machines or structures represented. Only length, width, and height were considered. Conveyors are simulated by colored string with wire nails for support. To depict tires and wheels on the conveyor lines, ordinary circular gummed-paper reinforcements are used. Giant Willow Run had to be laid out to handle materials and supplies from receipt through fabrication to shipment of completed product. Floor drains had to be located throughout the plant, compressed air stations planned. Other changes were required for installation of drying ovens, spray booths, assembly lines, hoists, and conveyors. The plant, which is shaped like an elongated *L*, lends itself to straight-line, continuous-flow manufacturing. Mezzanines throughout the plant serve as offices and subassembly areas



Flat templets are used for all component parts and assembled products. Templets are made of heavy-stock colored paper—light blue for the Kaiser automobile, light green for the Frazer. Car frames are indicated by a red wine color. On the assembly line, where car body and frame meet, a red templet is superimposed on the blue or green car templet. String, indicating conveyor lines, is colored the same shade as the material being processed. The color code has been threefold purpose of showing: (1) Product, (2) processes, (3) equipment. Colors deepen in shade as manufacturing and assembly processes progress

COLOR CODE USED IN SCALE MODEL

WHITE	:	Received materials
GRAY	:	Structural details
BLACK	:	Miscellaneous monorail conveyors and equipment, spray booths, paint-finishing bucks
YELLOW	:	Bonderite ovens
WINE RED	:	Car frames
CHERRY RED	:	Paint baking ovens
RED	:	Materials through paint

GREEN • Frazers cars and finished products

• **BLUE** Kaiser cars and finished products

"QUICK WAYS" TO LOW-COST OPERATION

Industry is always searching—*must* always *search*—for ways to cut costs. And, by and large, it searches for the big ones. This is as it should be—but in looking for the big ways, may it not be overlooking the thousand-and-one *little* ways? No one of them a

motion economy

1. Painting narrow outside edge of wooden frame by drawing it over felt-covered rollers with cupped centers allows one man to do the work of four. Paint is piped from an overhead container.

2. Errors in reading and recording are eliminated, and the time required to make visual scale readings is saved, by the installation of an automatic printing scale. Weights or dollar equivalents are printed on ticket as bags, parcels, pans, or pieces pass over the scale platform.

3. Winding enameled wire on spools is speeded by making a chuck that holds six spools on the spindle at a time, and securing them with a wingnut. The reels of unwound wire are mounted in parallel on a single stationary shaft. User claims savings many times the $10 cost of chuck.

materials handling

1. Handling costs were trimmed 30 percent when bag loading was simplified by tilting bags from the sewing platform to system of endless belt conveyors and chutes which carry them into the railroad car, where one man can stack them.

2. Motor-driven side motion to shift forks 6 inches to either side of center on a tilting, telescopic electric fork truck permits the load to be handled or "spotted" in close quarters, and is especially useful for tiering boxes or bales in compact, even rows.

3. Container costs were cut 28 percent by using lighter crates reinforced with steel straps. Handling costs were cut, too, because crate could be shipped on its side as a skid, and stored on end to save plant floor space.

buildings and services

1. Spray heads, lines, and condensing tubes of an ice machine are kept free of trouble by introducing into the water circulating system a low concentration of a substance designed to prevent formation of rust, and also to control formation of algae, slime, and other insulating deposits.

2. Use of a combination floor-scrubbing, rinsing, and drying machine in a metal-working plant makes it possible for a two-man crew to do a job which formerly required 15 men.

3. Breakage of glass in doors by slamming is cured by mounting the glass in ¼-in. channel felt like that used around car door windows.

4. Use of aluminum, light-reflective roof finish on a cold-storage warehouse lowered the internal

mechanical power drives

1. Centralized lubrication system for toggle presses in an automotive plant cuts down time from an hour or more to a few minutes a day, besides effecting a big saving in direct labor.

2. Maintenance on lineshafts has been reduced by burying them in trenches under the floor. For inspection or lubrication, the belt guard and the trench cover, to which it is welded, are lifted. Hangers are placed close to machine pulleys for easy inspection.

3. Variable speed transmission with 5:1 ratio permits regulation of conveyor speed to conform to production schedules and size of parts.

4. Changing to the proper grade of lubricant saved one company $268 a year in direct costs.

heating, ventilating, and air conditioning

1. Elimination of hot and cold spots, and of spring and fall overheating, by the use of unit heaters saved one company more than 15 percent on its heating bill, while permitting fuller utilization of wall and floor space.

2. Washed air, maintained at 70 deg. F. and 55 percent relative humidity, eliminates register trouble caused by stretching and shrinking of sheets, and cuts waste from cracked paper and slip sheeting in a printing plant.

3. Use of electrostatic dust precipitators on automatic glaze-spraying machines makes possible rapid and efficient collection of otherwise waste glaze in a pottery. Incidental saving is of space formerly used for settling chamber in which glaze was collected.

world-beater. Add them all together, though, and in dollar savings they may even beat the one or two big ways that every plant would like to uncover . . . and, as a rule, they can be done *right* now. It is this quick-way approach that FACTORY, in these days of higher costs all along the line, would like to commend to plant operating men. To remind them of it, the editors here present 39 cost-cutting ideas, each one of which has helped some plant cut its costs and increase its profits . . . and which can conceivably be used by other plants. For easy reference, these cost-cutters are grouped under five familiar classifications. Next month, similar "quick ways" in other fields—production control, preventive maintenance, production methods, factory lighting, and plant layout

4. Placing tote trays in a wheeled rack reduces interdepartmental trips, and cuts spillage to a minimum. Trays are pulled out as the work progresses, and then put back into the same carrier and wheeled to next department.

5. Porcelain parts are checked for thickness, throat dimensions, top recess dimensions, clearance of inside channel, and spacing of holes in bottom by means of a fixture designed for rapid inspection. Formerly operator had to pick up, position, and lay down each of five required gages.

6. An 87 percent increase in production resulted when an assembly job in which the left hand was used primarily for holding purposes was set up in the circular workplace manner for two-handed work. Operations are now symmetrical and in opposite directions.

7. Manufacturer employing many women has lessened fatigue by installing sliding chairs. Latter move along two steel angle bars that run the length of the machine, thus permitting operator easy access to any part of the machine while remaining in a sitting position.

4. Costs were returned the first year when a one-man, hand-geared, underhung crane running on the lower flanges of two I-beams was installed. With an electric hoist on the crane, it covers the shipping floor, and saves valuable floor space by permitting goods to be stacked higher.

5. One man using a mechanical loader can pack cotton seed hulls into a 50-ft. boxcar while remaining outside; formerly two men were required to work inside the dust-filled car.

6. The increase in production that resulted when a manufacturer of overalls and coveralls installed a trolley conveyor to carry freshly pressed garments through the drying oven in just the right length of time, is said to have paid for the machine in less than six months.

7. Small portable conveyor cut 62½ percent off loading time of boxcars and trucks by bringing bags or boxes to point where loader can stack them without moving about.

8. Savings of 10 cents on the handling dollar resulted from installation of an overhead monorail conveyor, which also saved floor space and eliminated congestion in crowded areas.

temperature enough so that a large part of the air conditioning equipment could be shut down.

5. One company whose concrete loading platforms were continually breaking and chipping under the impact of 500-lb. iron drums and cylinders being dropped on them, solved this problem by using a special hardening agent in its concrete.

6. Layout map of the plant, with all machines located by type and number, facilitates dispatching of maintenance men to the exact spot where required, and tells them what type of tools will be needed for work on the machine.

7. Numbering of fire extinguishers, with consecutive numbers in the same general location, and keeping an office record of charging dates, simplifies recharging, and makes possible waiting full 12 months between charges. Three or four extras, newly charged, are kept so that expiring units may be exchanged in a matter of minutes.

8. Loudspeaking telephone in a stockroom eliminates long walks that were necessary to answer calls on speaking tube. Amplified microphone permits clerk to answer from anywhere in room.

and a lot more in labor by lengthening regreasing period from three times a day to every ten days.

5. Records show that a steel-wire manufacturer increased production 20 percent by installing individually motored, variable-speed drives, thus eliminating delays from the slow process of making speed changes from fixed-speed drives.

6. A change to weekly grease lubrication with a hand pressure gun instead of more frequent hand oiling cut bearing replacement and direct labor costs in a textile mill, and resulted in smoother operation of the machines.

7. Flexibility of operation of a lineshaft drive and proper loading of motors is secured by dividing the shaft into two sections, joined by a coupling. For partial loads, both sections are driven by one motor. When full production is required, coupling is disconnected and each section is driven by its own motor.

8. Use of a 35-lb. filler tank for 9-oz. grease guns cuts lubrication time by eliminating frequent trips to the stockroom to refill the low-capacity gun.

4. In a room where there is a chance of alcoholic vapors escaping into the atmosphere, the air conditioning equipment is interlocked with the machinery so that machines cannot operate when the air conditioner is not working.

5. A New England manufacturer found that the chilling effect of opening and closing plant doors in the winter months could be lessened by the installation of unit heaters of the propeller-fan type blowing directly at the doors.

6. Placing fan in the elbow of a duct to discharge fumes from a nitric acid pickling tank eliminates action of the fumes on the fan. Fresh air blown out the horizontal section of the duct, while suction created in the vertical section draws fumes up, blows them outside.

7. Blower units near hammers and presses in a forge carry the heat and fumes away from operators, and cutting down illness.

8. Counterbalanced garage-type overhead doors serve as a simple air lock which helps to keep the shipping room warm in a northern plant. When one of the doors is opened, the other is automatically closed, and *vice versa*.

Everybody out but the watchman. Makers of 289 kinds of equipment—from abattoir machinery to zoo equipment—lost their source of vital ball bearings when New Departure closed

A FACTORY on-the-spot survey of the effects of the GM strike on a struck plant (New Departure), a struck town (Bristol, Conn.), and strikers' families brings the inescapable conclusion:

WHEN LABOR STRIKES EVERYBODY LOSES

Workers lost, too. Picketing became more monotonous than producing bearings ever had. It was peaceful, however, despite snow and 10-below cold. There was no violence throughout the 131-day strike. A soup kitchen was first of the welfare projects. Local had aid from locals in Bridgeport and Waterbury, which sent in "food caravans"

Never before has this country paid for a strike in manufacturing industry as long, as costly, as General Motors' battle with the United Auto Workers.

Costs to GM, workers, and dealers are estimated at $1,100,000,000. GM employees will need at least eight years at their new rates to make up the pay lost in the strike.

To show the meaning behind these loss statistics, FACTORY has surveyed results of the 131-day shutdown at New Departure, GM's ball-bearing division in Bristol, Conn.

Bristol's losses multiplied by 120 would give a conservative estimate of the cost to the nation of all post-war strikes.

Actually, costs can never be totaled. Withholding 1,000,000 automobiles from the market alone has pressured inflationary prices upward, forcing every family higher along the rising price spiral.

Today our economy can absorb the loss. But capitalism, under fire from many sides, cannot indefinitely afford labor-management strife on a major scale. Leadership in management and in labor must find the way to harmony.

This is the challenge—the greatest that American industrial leaders face.

CONTINUED ON NEXT PAGE

WHAT ND STRIKE COST

Strikes cost—cost a lot. But even the citizens of Bristol, where 7000 out of a total population of 38,000 were on strike 19 weeks, did not realize how much. To show that cost, FACTORY takes you to Bristol and into a striker's home.

In Bristol, New Departure, the city, and the strikers lost.

And the people of the United States lost. Seven hundred thousand youngsters are waiting for bicycles because New Departure, scheduled to produce more than 6000 of the famous coaster brakes a day, shut down. Thousands of workers—producing everything from dental equipment to derricks—lost work because the plant which alone produced more ball bearings than the Axis during the war, was closed. New Departure field men were able to satisfy thousands of customers during the strike by borrowing bearings or drawing from stocks, but most companies were on limited production schedules, anyhow, because of shortages.

At the deadline, 11 o'clock, November 21, 7000 New Departure employees

Like many an old resident of Bristol, Manager F. G. Hughes thought strike unnecessary

Determined to "see it through," Local 626, UAW-CIO, President Alexander Benecick, Strike Chairman Anthony DeLorenzo, and Treasurer James Armstrong discuss strategy. Fred O. Zurell and Clarkson Reed, other strike committee members, were not present

walked—not ran—out. Only six machines of nearly 5000 were not cleaned up, one small point of consolation for a management quietly proud of a labor relations record among the best in General Motors plants.

There was no violence, no injunction. Local 626 agreed after two weeks to allow office workers to return to their desks. Only two or three pickets at a time marched before each factory gate.

Bristol sat back to take a vacation welcome after nearly five years of highly productive effort. The strike would last only a few days, thought the town that grew up in New Departure tradition—to build better ball bearings, to build a better Bristol, to build people—to build better ball bearings.

ND workers turned out 450,000,000 bearings for war, more than the total production of the previous 27 years. They won an Army-Navy "E" with four stars, and the Governor's Cup. They bought nearly $19,000,000 of bonds, set records for suggestions, victory gardens, and blood donations.

After V-J Day, ND maintained high production, working three shifts, 48 hours a week. There was no layoff. In fact, ND was recruiting help outside Bristol when the strike began. Workers who'd forgotten that ND ever had a strike—it did have an 8-day walkout in 1914—thought this one wouldn't last.

The most rugged winter in years set in. Pickets were maintained despite snow, ice, and the monotony of having nothing to do except check passes. Local 626 passed in veterans who wanted to sign up for reemployment, its own members paying their insurance, and the increasing trickle coming in to get tools so they could earn a week's pay.

Christmas saw hundreds of ND families skimping on their stocking-filling, but the real pinch didn't begin to come until later. In January, ND men lined up in the banks to cash bonds.

Despite opinion general in Bristol that ND would never be struck if local management were dealing only with local union officials, Local 626 maintained pickets and morale. By mid-February an estimated 2000 of its members had to take temporary jobs. Perhaps another thousand had had to get help from the union or public agencies. But there was no talk—publicly—of a back-to-work movement. When Walter Reuther spoke on February 6 in Bristol High School, more than 1000 packed the hall to hear him, despite its raining "cats, dogs, and hammer handles."

Producer of 60 percent of all ball bearings used by the Allies during the war, New Departure's closing alone would have shut down General Motors eventually. Loss of estimated $15,000,000 worth of bearings during the strike limited production of equipment worth many times that figure

March 13, and announcement of the settlement in Detroit brought a lull. Everyone was sure it would be over in a few days. But when Strike Chairman Tony DeLorenzo explained progress of local negotiations before an audience of 700, March 20, and called for a vote, only four voted against staying out until local issues were settled.

Whether the union will emerge stronger in membership and morale won't be shown for months. Financially, it can count up its $15,000 strike fund, perhaps as much more contributed by UAW headquarters and other unions, the salaries officers contributed, and a loss of $600 to $1500 a member as its costs.

New Departure losses can be estimated at:

More than $15,000,000 in sales.

More than $4,000,000 in maintenance and other costs.

Incidentals that can't be totaled. Some strikers will never return to ND. Morale may be lower, may slow plant production.

How long will it take Bristol to recover?

New Departure was back in full production a few weeks after its employees returned. Because of strikes in other industries, it probably won't lose too much of its competitive position.

Bristol business, which saw a city-wide slowdown when it might have had a boom 20 percent greater than last year's winter volume, regained most of its "normal" volume about the time GM workers got their second pay check.

Bristol people—some will never regain their savings. Many a new car, new refrigerator, or college education has been sacrificed to the strike. And most strikers say they'll never get back what the strike cost them.

CONTINUED ON NEXT PAGE

Claire worries about bills. She hopes to get a job to help pay them off. They estimate it will take about a year just to clear up debts

Amusing Frankie, 9, and Shirley Anne, 3½, was a problem at times. The boys missed 18 days of school during the month of January

Claire cut food budget by one-third, but couldn't cut out milk altogether. Bills mounted at the rate of $2 a week throughout the winter

STRIKE MEANT NO SHOES HERE

This is the story of Joe and Claire Papa, their four bright-eyed, fun-filled youngsters—a New Departure family—and how they survived the strike.

When Joe came home at noon the day of the walkout, he had one week's pay and Claire had three $18.75 war bonds put away. Claire, who has always had to budget even the pennies, couldn't see how they could get by more than a week or two.

Joe—240 pounds, Italian-born, an ND worker 18 years—started to hunt temporary work. There was nothing in Bristol, but he finally got a laborer's job in New Britain. That ended after two days when he lost his ride to the job. The pay didn't justify carfare.

Claire then started hunting a job. She met refusals everywhere when she admitted her "husband was out of work, right now." She continued hunting until the middle of January when, with a job promised, she came down with the flu. Their two little girls, Arlene, 6, and toddling Shirley Anne, 3½, caught it too. Frank, 9, and Joe, Jr., 7, came down with colds. Joe went on 24-hour duty as nurse, cook, and housekeeper for two weeks.

The strike hit them harder than the depression ever had. Claire cut the food budget from $22 a week to $14 by cooking their chickens and buying spaghetti instead of pot roast. They gave up Sunday afternoons at the movies, abandoned their car, let the milk, bread, electricity, and grocery bills run.

In December, Claire's father began to help them, coming up every few days with $5 or $10. But $5 go fast when it takes three pounds of stew meat, half a peck of potatoes, and vegetables to make stew for one meal. To save feeding chickens, they butchered and ate ten in one week—enough even for Claire. The children went back to spaghetti in relief.

Christmas was saved from bleakness only when Claire's parents and her sisters bought a few toys. Somehow they struggled along, meeting a new crisis every day or two.

They accepted help from Claire's family until Joe saw it was too much.

Claire's father, with her two sisters both out of work because of the strike and her brother just discharged from the Army, couldn't carry them all.

Although he hated to ask for help from his friends in Local 626, where he once had been elected to the executive committee, Joe finally went to them. In the middle of January, the local began giving him a weekly order for groceries, and paid for two tons of coal.

With more snow and ice than Bristol had seen as long as he could remember, Joe kept Frankie, Joe, and Arlene home from school. Their shoes and rubbers weren't good enough to keep their feet dry many days. And Joe would rather have them home and well than have them to go to school and get sick.

BILLS TOTALED $600

Bills worried Claire, who, although she'd bought many things on time, had never missed paying her bills before. A Boston finance company, holding a note with a balance of $268 for siding put on the house last August, demanded full payment after three installments had been missed. That threatened the little house Joe had built himself. Joe built the four-room home on a double lot topping a hillside overlooking Bristol in 1939. They moved in before interior partitions were up. Joe finished their bedroom—with Claire holding the light for him—just in time to have Arlene born in the big bed next day.

The light company sent its final notice. Other bills could go, but these two had to be met. Joe had already cashed their insurance policies and couldn't ask more help from Local 626. He went to the local committee representing the National Committee to Aid GM Strikers. There, a lawyer wrote the finance company for an extension and helped him make a token payment on the light bill.

Joe plans to mortgage the little house to pay up all the bills. Then Claire wants to get a job, do her housework in the evenings, to pay off the mortgage. It will be a year, at least, before they can clean up their debts. Joe says frankly, "We'll never get back all this strike has cost us."

Tougher than bills for Joe was the problem of passing time. Inaction and strain worried him until he couldn't sleep more than an hour or two at night. He went to bed at 2 a.m., was up again at 5 o'clock. They were long, long days.

CONTINUED ON NEXT PAGE

Like a Midwestern farm wife, Claire improvised pillow covers from feed sacking. She has always budgeted, made her own clothes for 10 years

Buying candy or pastries was out. Stores in Bristol saw the demand for everything but cheap, basic foods fall to nearly nothing

Passing time was Joe's biggest problem. He sat and smoked, read a little, sat some more. Worry cut into his sleep, made days even longer

SALES DOWN, SAVINGS DOWN

What happens to a city that has two-thirds of its workers on strike 131 days?

FACTORY selected Bristol as a representative "struck town" where enough workers had been on strike long enough to show measurable results. But the answer did not appear on the surface.

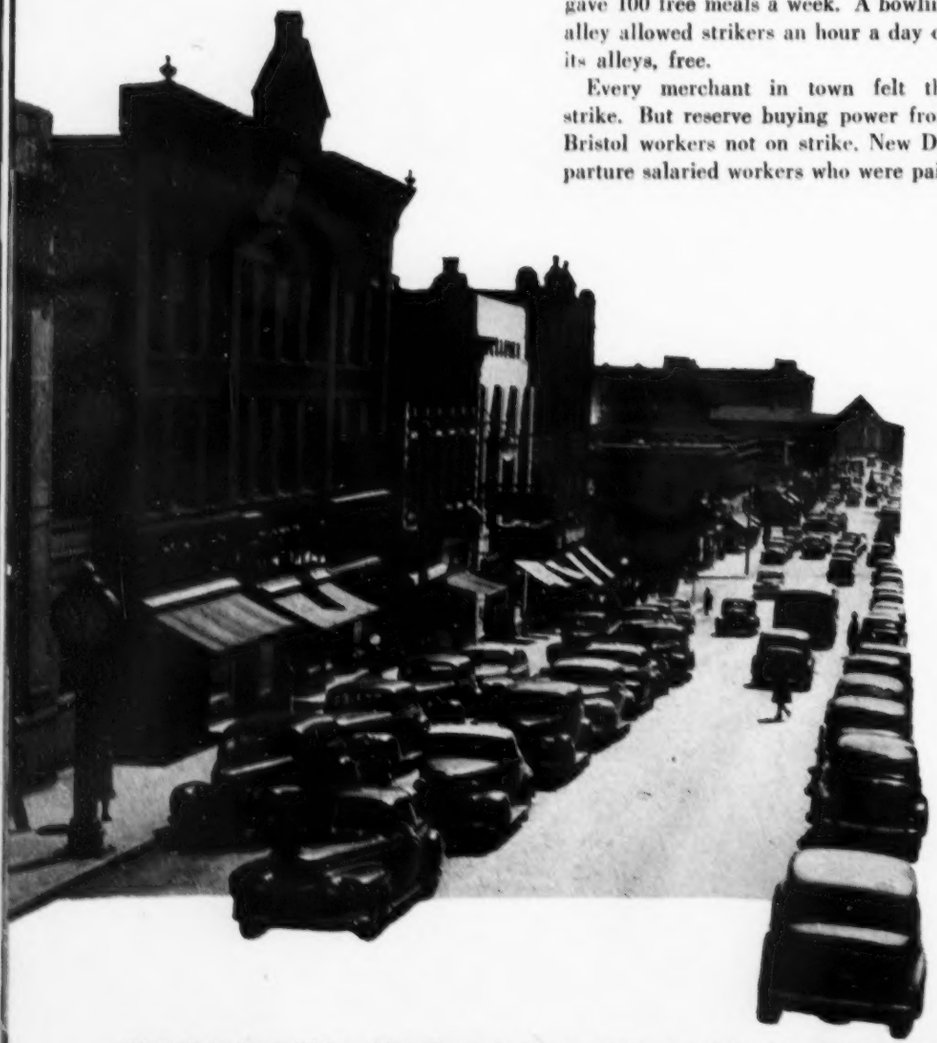
Main Street on Friday afternoon had as much traffic as it did last October. Even with two-thirds of its industrial workers out of work, losing more than $5,000,000 in pay, the effects weren't obvious. The town's over-all economy hardly suffered in the first 100 days of the strike.

What did happen?

Strikers dug deeply into savings, into insurance, and into war bonds—spending reserves of $600 to $1500 a family. They borrowed money, too, from relatives and, in the case of 1900 families, from the local finance company, which helped old customers and prospective future customers by carrying them through the strike period.

No striker can obtain unemployment compensation in Connecticut. Most could not get part-time jobs because employers knew they'd go back to New Departure. But they did have help from the neighbors. Businessmen who did not respond when Local 626, UAW-CIO, solicited, reached deep to help the folks next door. One woman gave away 30 dozen eggs to strikers. A restaurant gave 100 free meals a week. A bowling alley allowed strikers an hour a day on its alleys, free.

Every merchant in town felt the strike. But reserve buying power from Bristol workers not on strike, New Departure salaried workers who were paid for the duration, and veterans buying clothing, houses, and furniture kept business fairly close to normal along Main Street. Merchants there — with the help of nylons, shirts, refrigerators, sheets, tire chains, and other scarce items—did perhaps 80 percent of last year's winter business.



This is Main Street, Bristol, with traffic nearly normal on 120th day of the strike. Despite having two-thirds of the city's workers on strike, Main Street had all-time record Christmas sales, saw its retail business stay close to normal during the first three months

DEPRESSION ROW

When you made the turn from Main Street, passed City Hall, and entered the half-mile stretch of small shops along North Main leading to New Departure, though, you hit "depression row."

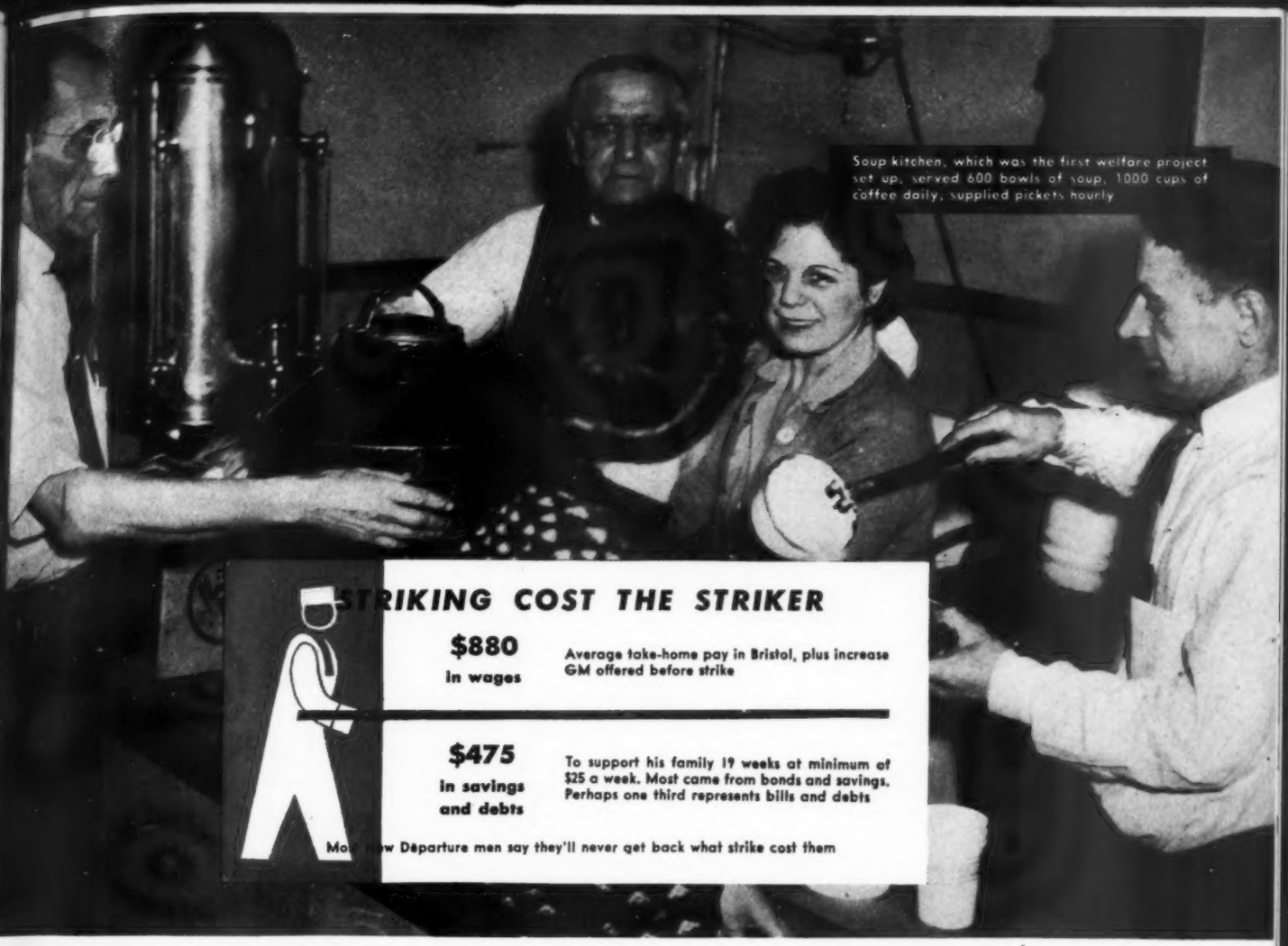
A furniture store there saw sales fall, collections go down 85 percent. Drug stores, selling only necessities, often on orders from Local 626, had their over-all trade cut in half. Women's wear retailers, with none of the veterans' business that kept men's wear up, had sales go down 75 percent. The proprietor of many a specialty shop, radio store, beauty parlor, or package store sat back and read the newspapers, even on Friday and Monday, best business days.

Hardware stores saw their volume cut in half because even men with months of spare time couldn't repaint their houses in winter. Automobile accessories did maintain their volume, however. ND workers bought scarce tools, chains, and parts to repair their own cars. Veterans were buying cars that took piston rings and new valves in case lots.

Barkeeps reported that only veterans with unemployment insurance were drinking—and they drank beer. The hard liquor demand in package stores fell perhaps 90 percent, but beer wholesalers sold all they could get.

Mayor Daniel Davis declared that no one in Bristol would go without food or fuel this winter. And they didn't. Grocers, milk, fuel, and bread companies allowed their old customers credit. Local 626 food, fuel, and medicine orders helped 500 families. One independent iceman had his collections cut in half, had 60 of his 205 customers owing him from $12 to $18 each.

Veterans who had just returned to work were perhaps hardest hit. Cut off from federal or state unemployment



Soup kitchen, which was the first welfare project set up, served 600 bowls of soup, 1000 cups of coffee daily, supplied pickets hourly

STRIKING COST THE STRIKER

$880
in wages

Average take-home pay in Bristol, plus increase GM offered before strike

$475
in savings and debts

To support his family 19 weeks at minimum of $25 a week. Most came from bonds and savings. Perhaps one third represents bills and debts

Most New Departure men say they'll never get back what strike cost them

STRIKE COST BRISTOL

$5,700,000
payroll

Total for 19 weeks does not include 10 percent increase salaried workers received November 1 and 5 percent additional granted February 15

$3,325,000
savings

The minimum needed for 7000 workers in 19 weeks they were on streets. Adding indirect loss to hundreds will raise total over $4,000,000

30%
business volume

Estimate of Bristol merchants' loss when they looked forward to an over-all gain of 20 percent

$50,000
relief

Relief costs were low; Bristol families used their own resources largely, but 1000 families needed help

elapsing before families can pay off debts—will affect Bristol's economy for years

North Main Street, leading to New Departure and depending on ND payroll, saw merchants' volume cut in half, collections down 85 percent

compensation, they turned to Seicheprey Post No. 2 of the American Legion, the Red Cross, Community Chest, or Bristol Servicemen's Center for help. The Legion, which administers Connecticut's Soldiers', Sailors', and Marines' Fund locally, helped about twenty families in the first three monthts of the strike, then, in a few days, saw fifty applicants come in.

CUSHION OF SAVINGS

Because Bristol — an old industrial city in the heart of Connecticut—had built up a savings habit as well as industrial skills in its Yankee, Irish, French, Polish, Italian, and other, smaller, national groups, New Departure people had a cushion to fall back on. Savings accounts in Bristol banks total almost $40,000,000. They've shrunk slightly in the strike, although the Bristol Savings Bank has seen its $20,000,000 savings account increase slightly. The ratio of deposits to withdrawals at the Bristol Savings Bank, though, which used to be 2.5 to 1, fell to only slightly more than 1 to 1.

War bond sales made up the biggest part of the cushion. ND people bought bonds with a total maturity value of $18,798,000 during the war. The North Side Bank & Trust Company, closest of Bristol's banks to New Departure, cashed them at the rate of 125 to 150 a day in February, when a year ago five were redeemed daily. Redemptions totaled hundreds of thousands of dollars monthly.

Insurance, too, helped hold relief costs in Bristol down. Insurance companies in the city paid out about $3500 a week to strikers cashing policies. Family resources built up through years, increased by wartime earnings, kept relief costs astonishingly low in the first 100 days of the strike. Local 626's soup kitchen and its welfare committee, using a strike fund made up by assessing each member $1 a month in the two months before the strike, handled the relief problem for the first three months without calling on outside agencies for too much help.

Then, as strikers' families ran through their reserves, relief became a problem. Three psychiatric cases in one day came into the Family Welfare Association—the result of anxiety prolonged over 14 weeks of no work and no pay. The Association's regular cases, needing temporary care or minor medical attention, suddenly doubled. Director Inez Hess, who in mid-February became chairman of Mayor Davis's committee to represent the Nationl Committee to Aid GM Strikers, had 30 new cases apply to the Committee in one day. The Committee had already contributed $3500 to relieve Bristol strikers, continued to aid more than 100 families at the rate of about $1000 a week through the strike. The city department of public charities, indirectly and directly, found itself having to help out more than 100 families of strikers.

The Salvation Army, which aided 160 families in the first three months with emergency food and fuel orders and had distributed three tons of clothing so strikers' children could continue in school, had its cases double in a few days. Capt. E. William Worthy ran well over his Post's budget to meet the emergency.

Spring came early in Bristol this year, though. After March 13, when the national settlement was announced, the tension broke. Work in the woods and fields opened up, offering part-time jobs for many. The end seemed near, and even with the growing roll of New Departure families needing help, Bristol had the problem well under control. As one striker put it, "We got through the depression on WPA. Now we've got CIO relief."

There were tears in many eyes, though, Sunday evening, March 31, when Local 626 voted to ratify the local agreement and New Departure announced that 500 maintenance men would be called back immediately to recondition the plant. The 131-day strike brought many a family near to the breaking point.

CHALLENGE TO LEADERS

Because strike losses are too far-reaching, too long lasting, Bristol will never be able to measure its costs in dollars definitively.

The total cannot be ignored, though. The United States, depending on the efficiency of its industry and its workers to maintain the world's highest living standard with the world's highest-paid labor, will not be able to pay for large-scale industrial battles forever.

Joe must follow his leaders. Bristol's City Council cannot petition peace in Bristol industries. Washington cannot legislate lasting settlements. The challenge is to leadership—American cooperative leadership in management and in labor.

"No one in Bristol shall go without food or fuel this winter." Mayor Daniel Davis expressed Bristol's relief policy for strikers

"We had to help them, didn't we?" This iceman spoke for many fuel dealers, dairies, and services. Merchants allowed their old customers credit to get necessities for living

Salvation Army, like all relief agencies, was not prepared for strike, was not pressed too badly until early March, when many strikers' families reached the limit of their resources

CONTINUOUS-FLOW HANDLING LOWERS UNIT COSTS 40 PERCENT

G. A. VAN BRUNT • ASSOCIATE EDITOR, *FACTORY*

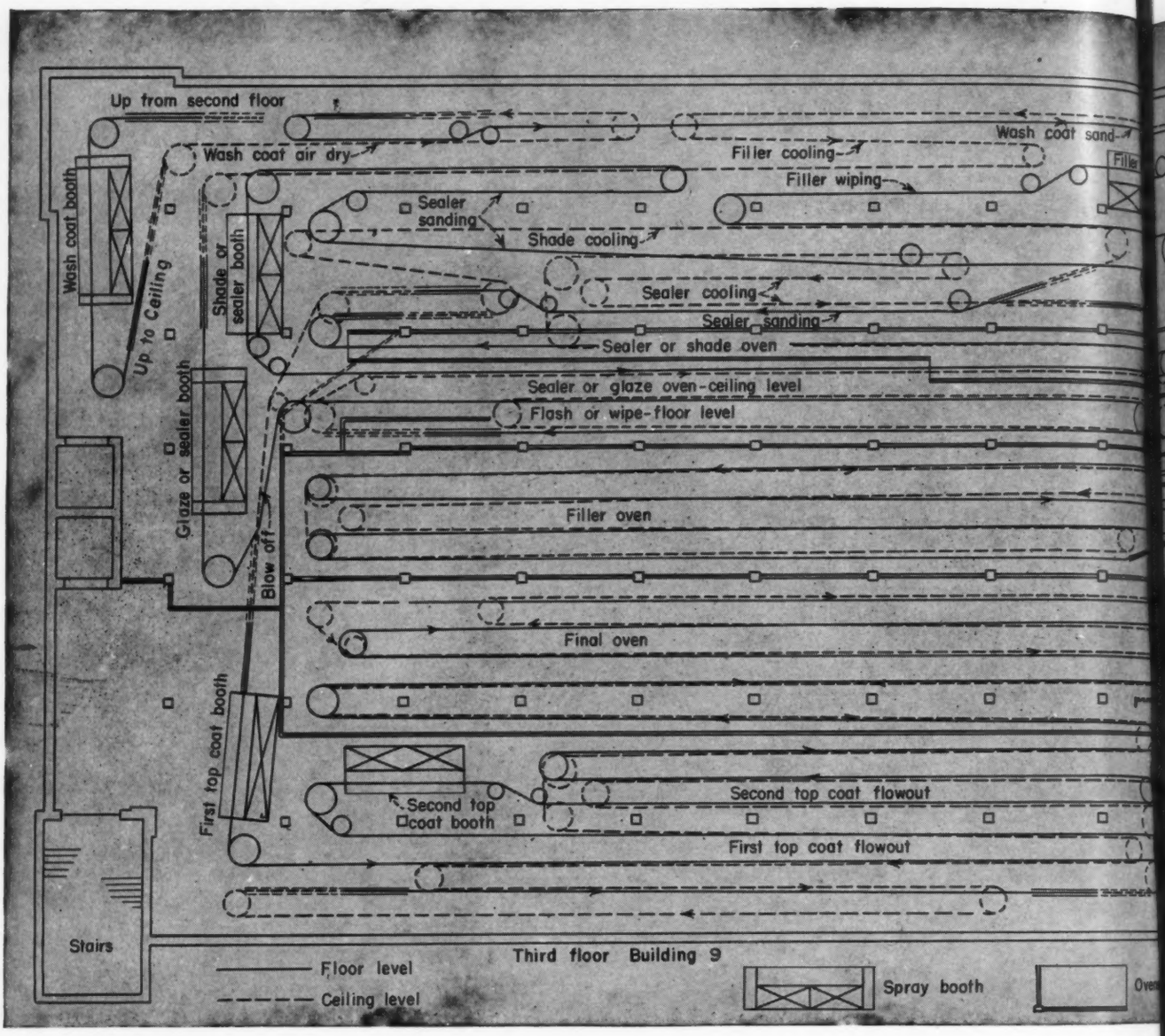
A well-known company in an industry that has been noted for craftsmanship rather than mechanization combines both to produce better products at lower cost for wider distribution. In so doing, it adheres to the simple formula that has given America the world's highest standard of living

Putting in a system of conveyors and ovens for assembling and finishing furniture has about doubled plant capacity at The Mengel Company, Louisville, Ky., reduced in-process time from 48 to about 12 hours, and lowered production costs about 40 percent. Along with these advantages goes a significant increase in the quality of the products.

The plant in which these conveyors and equipment were installed makes bedroom furniture, dressing tables, chests, and similar items. Over the years advantage had quickly been taken of new equipment or methods that would make it possible to improve quality or reduce production costs. Some time ago it was recognized, however, that much more radical measures were required to meet the goals that had been set. The gains that were possible

From the assembly conveyor the pieces are pushed onto a revolvable inspection table, which is raised and lowered by air pressure. Defective pieces go to the right. Those passing inspection are moved to the left and put on the chain conveyor

Dressers and other pieces are assembled, the drawers fitted in them, sanded, and made ready for finishing, on this 101-ft. slat conveyor on the second floor. Moving toward the back, it feeds the inspection and loading area of the chain conveyor



by making changes here and there were not enough.

For a better understanding of the problems and how they were solved, it should be said that after a piece of furniture has been assembled it goes through a number of finishing operations. These operations include staining, filling the pores of open-grained wood, color toning, sealing, and the application of one or two finishing coats. Depending on the wood and the kind of finish desired, some of these operations may be omitted, or others added.

Between these operations there are others, such as wiping, sanding, and rubbing, which are necessary to give the finished article the desired appearance.

Formerly the work was taken from one operation to the next on skids or trucks. Extensive use was made of air drying. Oven or forced drying found limited application. The result was an excessive amount of floor space devoted to air drying, and a large amount of manual handling.

It was decided to transfer as much handling as possible to conveyors, and use oven drying wherever there was any advantage in doing so.

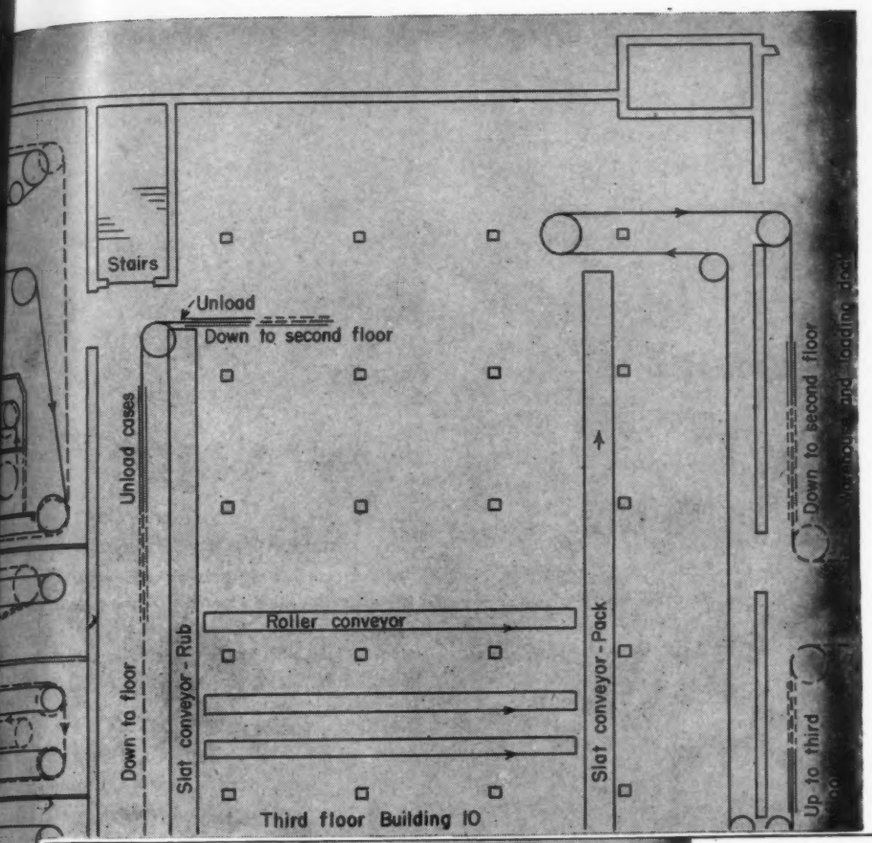
Accordingly, every assembly and finishing operation was investigated and time studies were taken. An entirely new layout was made, and the proposed conveyor systems were designed around this layout.

The time required for the finishing operations mentioned before varies from less than a minute to nearly an hour. Therefore great care had to be taken in locating the spray booths and ovens and allotting the space for wiping, sanding, and other operations to make sure that enough time is allowed to do the work properly.

The backbone of the system is an overhead chain conveyor 9140 feet long, suspended from ball-bearing trolleys spaced on 2-ft. centers. It carries 1523 trays approximately 30 inches wide, spaced 6 feet apart. These trays are designed to carry chests, bed ends, and other large items. A long hook for carrying smaller items, such as mirror frames, is suspended between trays.

The capacity of the conveyor when fully loaded is more than ten carloads of furniture.

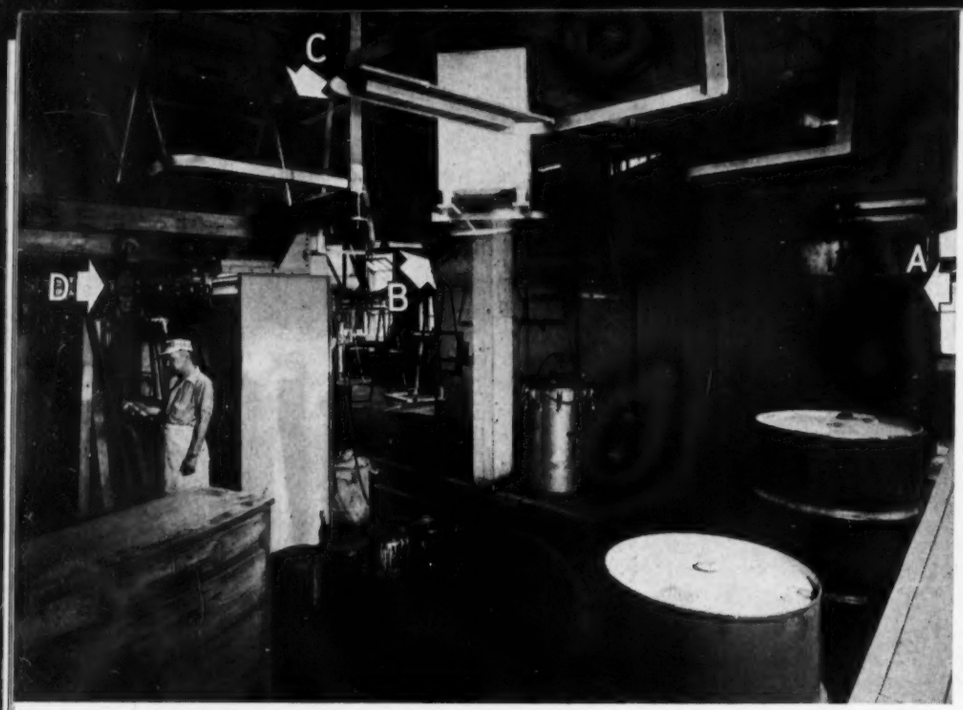
The conveyor is driven by six 2-hp. shunt-wound d.c. motors. A master con-



The 9140-ft. overhead chain conveyor rises and dips 28 times as it threads its way through the second and third floors. Spray booths, drying ovens, and most of the sanding and rubbing stations are on the third floor, which contains the greater length of conveyor—approximately 8165 feet. In some areas the conveyor is suspended close to the ceiling; elsewhere it is mounted at such height that the trays are only 4½ inches from the floor. Any speed between 4 and 28 feet per minute can be obtained through the master control

OPERATIONS ON CHAIN CONVEYOR AND TIME ALLOWED FOR EACH

Station No.	Name	Floor	Operation	Time at 12.5 Feet per Minute Hours	Time at 12.5 Feet per Minute Min.	Time Between Stations Hours	Time Between Stations Min.
A		2	Load		6.72		6.72
B		2	Sap stain		3.62		3.62
1	Back stain	2	Spray		1.28		1.28
2	Toner stain	2	Spray		1.60		33.04
			Air dry		0.88		
			Force dry		11.20		
			Air cool		19.36		
3	Wash coat	3	Spray		1.67		33.18
			Air dry		24.79		
			Sand		6.72		
4	Filler	3	Spray		1.60	2	36.67
			Wipe and clean		15.80		
			Force dry	1	46.40		
			Cool		32.87		
5	Sealer or glaze	3	Spray		1.60	2	1.25
			Air dry or wipe		27.04		
			Force dry		48.00		
			Air cool		26.77		
			Sand		12.32		
			Decorate		5.52		
6	Shade or sealer	3	Spray		1.60	1	4.44
			Air dry		9.36		
			Force dry		16.73		
			Air cool		22.75		
			Sand		7.20		
			Blow off		5.68		
			Inspect		1.12		
7	First top coat and/or shade	3	Spray		1.60		28.33
			Air dry		26.73		
8	Final top coat	3	Spray		1.60	4	9.74
			Air dry	2	32.14		
			Force dry		8.00		
			Air cool	1	28.00		
C		2	Unload		2.56		2.56
			Return		30.77		30.77
			TOTAL	12	11.60	12	11.60



Coming up, at the right, from the second floor to the third, the conveyor carries the pieces through the spray booth at the rear, for the wash coat. Following a U-turn it rises to the ceiling and turns right. After other operations (not shown), the conveyor circles back at the left. Arrows show direction of travel. *A*, entering wash coat booth; *B*, to wash coat air dry; *C*, to sealer or glaze; *D*, to shade or sealer booth

The conveyor is coming from the wash coat air drying and sanding operation. Then it passes, center, through the filler booth and circles back through the filler wiping station and drying oven, left

trol in the shop superintendent's office permits operation at any speed from 4 to 28 feet per minute.

Provision has been made for stopping the conveyor at six different points or stations.

As will be seen from the accompanying schedule and schematic layout on pages 130-131 the conveyor serves eleven so-called stations, of which four are on the second floor and seven on the third floor. However, the length of conveyor operating on the third floor is much longer than that on the second.

Following the chain conveyor, there are thirteen sections of roller and slat conveyors for the speedy rubbing and packing of finished articles. These sections vary in length from 50 to 101 feet, and have a total length of approximately 1775 feet.

The installation of five large ovens has reduced the drying of stains, fillers, sealers, and finishing coats literally from hours to minutes. Altogether, keeping pieces practically continuously in motion on conveyors from the time they are assembled until they are packed and sent to the warehouse, has cut the time required for assembly and finishing operations from 48 hours to a little more than 12 hours, on the average. This despite the fact that four additional operations have been added which definitely improve both quality and appearance.

After the final rub and wipe the pieces are pushed onto one of six lines of 60-ft. conveyors (five roller and one slat type) which were installed at the right after this view was taken. These conveyors not only minimize the amount of manual handling, but also serve as temporary storage when pieces come through faster than the packers can handle them. The roller conveyor shown leads to the warehouse, will be replaced by 1100 feet of overload chain conveyor

Off the chain and onto a slat conveyor, the finished pieces are rubbed and wiped preparatory to packing for shipment. *A*, from final cool; *B*, unloading point; *C*, conveyor returns to second floor

Top right, after leaving filler drying oven pieces go through sealer or glaze booth. *A*, to sealer or glaze; *B*, from booth; *C*, glaze wiping; *D*, from shade booth; *E*, to first top coat booth

Here various sections of the conveyor move in different directions and on both the floor and the ceiling levels. Functions or destinations of these sections are: *A*, from the sealer oven; *B*, sealer air cool; *C*, sealer sand; *D*, up to shade cool from oven; *E*, shade air cool; *F*, from shade cool to the first top coat booth; *G*, work area; *H*, oven

Right, pieces are given the finish coats and dried in warmed, filtered air. *A*, first top coat booth; *B*, to air dry; *C*, to final coat booth; *D*, to air cool; *E*, from final air cool to unloading

Here is an example of the American way—which is to make a product people want, to sell at a price people are willing to pay, at a profit. It's a pat example of what *can* happen here.

It's the familiar case of the small company that starts with an idea—just as small companies in this country have always started. The idea happens to be the now famous Reynolds pen.

Newest model, announced April 15, utilizes a new printer's ink, includes a retractable cap which is slid over the ball-bearing point when the pen is not in use, an ink chamber that contains a supply of ink sufficient for 10 to 15 years of normal writing, and carries a 4-year ink supply guarantee.

Reynolds International Pen Company, Chicago, produced its first pen on October 6, 1945, in what was once an indoor tennis stadium. The next day 70

For close control of quality, Reynolds checks the tolerance—one ten-thousandth—of the writing ball. This is one of several precision tests through which the ball-pointed pens pass

FROM 70 TO 30,000 PENS A DAY IN SIX MONTHS

REYNOLDS EXEMPLIFIES THE AMERICAN WAY

pens "rolled off its lines." Production has now—some six months later—reached 30,000 units per day.

The point is, here is the small company—initial capital, $26,000—which has not let shortages of materials or inability to buy new equipment or anything else stop it from doing the job it set out to do.

Note, for example, the use of a battery of electronic comparators to inspect ball points and to control quality. Note the specially developed machine that employs centrifugal force to inject exactly the right amount of ink into the barrels of twelve pens simultaneously.

Reynolds does not pretend to have licked all its production problems. Biggest job at the moment is to improve its methods. Refinements are sure to come thick and fast in an organization that was able to start from scratch and go so far so fast. Meanwhile it seems likely that Reynolds will continue to get out the goods the public is looking for—at a price the public is willing to pay—at a profit. That's the American way.

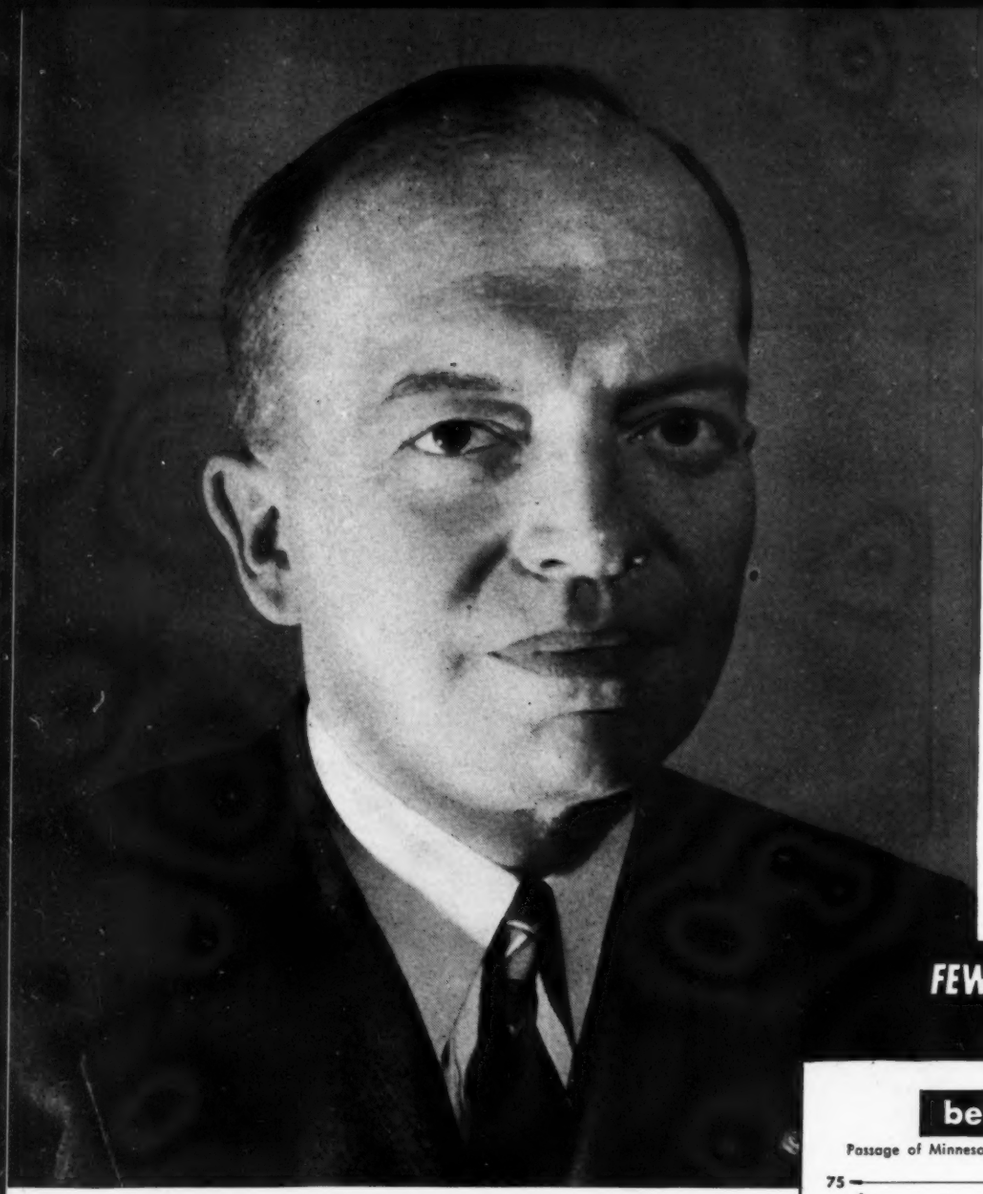
Reynolds pen production requires about 6 miles of aluminum tubing daily. Aluminum parts are machined in a quality shop located near the plant. Here tops are fitted to barrels

A jewel is attached to each cap as pens move down the assembly line. More than 3000 jobs have been created—in what was until recently an indoor tennis stadium

Each pen must pass through a series of exacting writing tests on the way to final inspection. After leasing the plant for several months, the company bought it, and adjacent land which is now available for expansion

←

Special machine, developed by company engineers, whirls at high speed to inject by centrifugal force the exact amount of ink—enough for at least two years of normal writing—into the barrels of twelve pens simultaneously



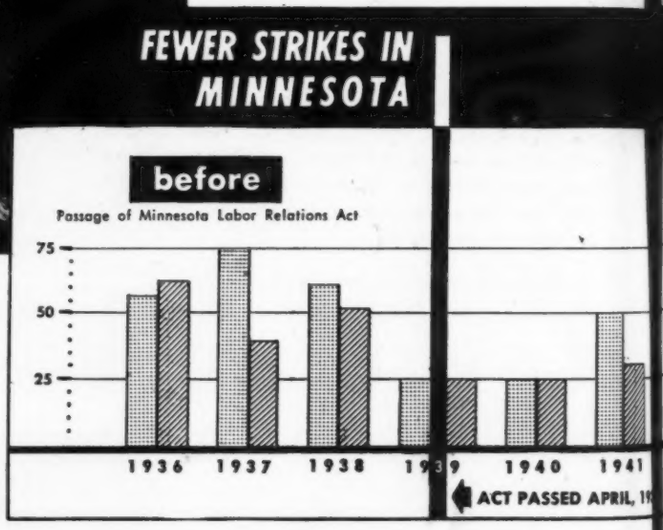
Press Association

As Harold E. Stassen, former Navy Captain and Governor of Minnesota when the law was enacted, put it, "We've seen to it that capital and labor count ten before they start fighting—and they take a day for each count"

***Factory* asked Captain Stassen, "Can the Minnesota law as described in this article be applied nationally?"**

"Yes" says the man who sponsored it. "The principal provisions of the Minnesota Act do furnish a basis for desirable national legislation, but additional provisions are needed, including a method for settlement of jurisdictional disputes between unions and to insure increased democracy within unions

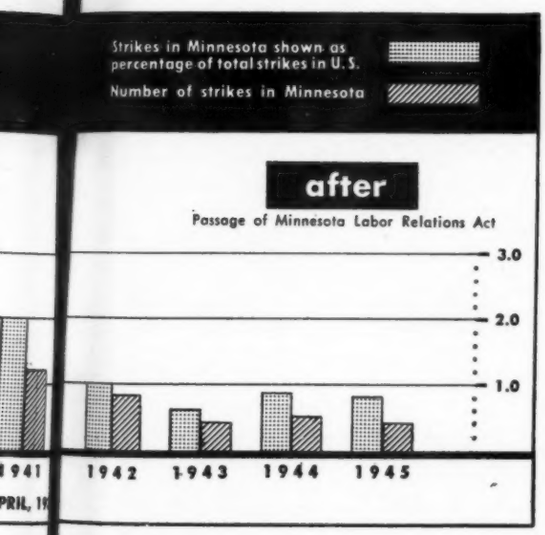
"Main cause of present strikes has been inadequacy of government which fostered the impossible idea after V-J Day that a 30 percent raise in wages could be had without an increase in prices, and which failed to exercise constructive leadership on post-war economic policy"



MINNESOTA'S LABOR LAW: PATTERN FOR NATIONAL LEGISLATION?

Amid the nation-wide scene of strikes and industrial turmoil, at least one state continues to enjoy relatively harmonious relations between management and labor. That state is Minnesota. For seven years it has had a labor relations law which requires a "cooling-off" period before a strike or lockout can become effective. If a dispute threatens to endanger the public welfare, that cooling-off period can be further prolonged while a fact-finding commission endeavors to get both parties to reach an agreement.

It is a law both the public and employers seem to like. For one thing, "quickie" strikes have been virtually eliminated. Labor opposed it at the beginning, called it the "Stassen slave act," after Gov. Harold E. Stassen, who pushed the bill through the state legislature in the spring of 1939. Today, however, even that opposition is disappearing, despite the fact that the Minnesota Labor Relations Act drastically curtails the use of labor's chief bargaining weapon—the calling of a strike on sudden notice.



Apparently the law is working. During the three years before its adoption, from 1936 through 1938, the annual average of workers on strike in Minnesota stood at nearly 16,000. During the next seven years, from 1939 through 1945, the annual average of Minnesotans on strike skidded to about 5000. Yet during those two periods the national annual average of strikes rose 30 percent, according to statistics of the U. S. Department of Labor.

In 1943, the peak year of war production, records of the Bureau of Labor Statistics show that among 22 of the principal cities in the country (12 larger and 9 considerably smaller) Minneapolis, the state's largest industrial city, had the lowest number of strikes and the fewest man-days of idleness.

The Minnesota Act may not be the only key to this drop in strikes. Part of it may be credited to the determination of management and labor during the war years not to interfere with vital production. But any law of a state that has such an excellent strike record deserves attention, not only from other states, but also from the federal government. Sometimes the whole can learn from one of its parts.

What are the provisions of the Minnesota Act? Has it prevented strikes? If so, how has it done so?

To begin with, the expressed purpose of the Minnesota Labor Relations Act is not merely to define or to punish certain unfair labor practices. It is instead to work toward *the avoidance and settlement of labor disputes and the promotion of industrial peace.* In Minnesota the settlement of such disputes rests with State Labor Conciliator.

The law works like this:

Whenever an employer or labor group wants to negotiate an agreement or change any conditions of work, the other group must be notified. For ten days after notification both sides are expected to work out a peaceful solution. After that, the employer may announce his intention to lock out, or the employees their intention to strike.

The intention to strike or lock out must be announced in writing to the other party in the dispute and to the Labor Conciliator. At least ten days must then elapse before the strike or lockout can become lawful.

During those ten days the Conciliator swings into action. Employers or employees may, of course, ask his aid *before* a strike or lockout is actually threatened. As it has worked out, however, the Conciliator and his assistants usually attempt to bring about a settlement only when work stoppage is actually threatened. They arrange conferences and take part in as many as they can—occasionally a specially appointed conciliator may take over.

During these informal conferences the Conciliator, as chairman, reviews the progress that has been made and talks over the problem with both sides. Frequently in these discussions he suggests a way for a settlement. Sometimes it is necessary for the Conciliator to meet with each group individually, later bringing the parties together. Generally most of the troubles are ironed out satisfactorily in one or two meetings. Sometimes there is a misunderstanding between the two groups. Some of the larger conciliation cases require anywhere from 10 to 15 meetings.

STRIKES ARE POSTPONED

But meanwhile the law has accomplished one of its main objectives—postponement of a strike during which time employers continue full-scale production and employees continue to draw pay checks.

All the agreements entered into in the conciliation meetings are arrived at through the *voluntary consent* of the parties to the dispute. *The Conciliator cannot force the parties into a settlement, nor does he ever attempt to do so.*

Since April 24, 1939, when the law went into effect, in only three minor cases have employers or labor union representatives failed to appear at a conciliation meeting. And those failures to appear are chalked up by officials at the Conciliator's office as largely caused by conflicting personalities.

Besides defining his duties of conciliation, the law makes the Conciliator responsible for determining the proper unit for collective bargaining. He must certify proper representation for employees determined by means of a secret election or otherwise.

If two parties wish, he may also set up a procedure for arbitration, acting either as arbitrator or appointing arbitrators to act as a temporary arbitration tribunal. Such tribunals may subpoena witnesses and hear competent evidence.

In the first year of the Act, the Conciliator received a total of 742 notices covering intention to strike or lock out, request for assistance *before* filing a strike notice, request for arbitration, and for determination of a collective bargaining agent.

Of that total, 383 disputes were settled by conciliation, anywhere from one to ten meetings being held for each dispute. The settlements took place either during the conciliation meetings or after. In these cases the Conciliator simply laid the groundwork for both parties to agree by themselves in direct negotiations.

In 101 cases, disputes were settled

without conciliation, the parties in the dispute having reached agreements by themselves before a conciliation meeting was actually held. The rest of the notices were disposed of by arbitration, certification of collective bargaining agents, strikes, lockouts, and so forth.

In that first year of operation, 553 notices of intention to strike were filed, but only 38 strikes actually occurred!

To show how the law has worked out to date, here is the yearly record of strike notices filed and the number of strikes which actually occurred:

Year	No. of Strike Notices	No. of Strikes
1941	421	34
1942	559	29
1943	235	12
1944	150	7
1945	161	10

The drop in strikes from 1941 through 1945, the latest date for which figures are available, reflects the tendency toward a reduction in strikes following the United States declaration of war.

A small proportion of the labor disputes referred to the Conciliator involve threats of strikes or lockouts which, if they materialized, would endanger the "life, health, or well-being of a substantial number of people." In such cases, the Conciliator invokes the public interest provision of the law by notifying the governor. The governor, if he sees fit, appoints a fact-finding commission made up of three persons representing the public, employers, and labor, to conduct a hearing, report on the issues involved and the merits of the respective contentions of the parties to the dispute. This commission has subpoena powers, *and its reports must be made public.*

HOW COMMISSION WORKS

If such a commission is appointed, the Conciliator immediately notifies all parties to the dispute and tells them the date of his notification of the governor. The fact-finding commission has 25 days to investigate and make its report to the governor. In that time, and for five days after, no strike or lockout and "no change in the situation affecting the dispute" may be instituted. Meanwhile, the Conciliator continues to try to bring about a settlement of the dispute.

In 1944, only 11 referrals to fact-finding commissions were made. With the exception of 2, which were submitted to the National War Labor Board, the commission reports were accepted or were the basis for further negotiation and agreement. No strikes took place.

In 1945, of 19 disputes turned over to fact-finding commissions, 7 were settled during the commission's hearing, 2 were settled by direct negotiations, 4 by the Conciliator after parties refused to accept commission recommendations.

Minnesota's fact-finding commissions, as their name implies, are fact-finding bodies. Witnesses appearing before such commissions testify under oath and are subject to direct examination, cross-examination, and to questioning by the commission itself. The commission does not act as a board of arbitration. There is no force or compulsion in accepting or rejecting the report of the commission, and, if necessary, *following the submission of a report, the Conciliator continues to try to get a settlement.* Should such conciliation efforts fail, along with the efforts of the fact-finding commission's recommendations, then the prestige of the governor's office is sometimes brought to bear upon the parties in disagreement.

A CASE HISTORY

An example of how the fact-finding phase of the law works can be found in a recent dispute involving workers of the Northern States Power Company. The International Brotherhood of Electrical Workers-AFL, refused to accept a War Labor Board directive issued after V-J Day denying the union's request for a modification of the company's current vacation plan and wage levels. On August 21, 1945, the union, in a letter to Lewis Schwellenbach, Secretary of Labor, gave notice of intention to strike. Two days later, it filed a strike notice with the State Labor Conciliator.

Such a strike would have affected 16,000 workers, shutting off electrical supply for St. Paul and Minneapolis and much of the surrounding area.

During the 10-day waiting period the Conciliator attempted to get management and labor to reach an agreement. He failed to do so, although the waiting period was extended an additional ten days.

Gov. Edward J. Thye then invoked the public welfare provision, postponing further action by either of the parties for another 30 days, pending report of the fact-finding commission.

At the end of 25 days the commission recommended that the union accept the WLB directive for 1944-1945, and sit down to negotiate a new contract for 1945-1946. When the union rejected this recommendation, Governor Thye, in the last five days of the cooling-off period, called both parties in the dispute to his office for an all-day session. "Such a strike just can't happen," he said.

As the parties returned from lunch, they met in separate rooms. The union then sent an offer to the company. The company responded with a counter-offer. Soon there was constant communication between the two parties. Finally they again met jointly. A last-minute hitch delayed agreement an hour. Again the governor intervened, persuading the union to accept the WLB directive for 1944-1945 and to sit down and negotiate a new contract for 1945-1946.

Since many disputes affecting the public interest naturally involve parties operating in interstate commerce, one of the questions that has arisen is that of jurisdiction between the National Labor Relations Act and the Minnesota Act. This question has been answered in practice by applying the waiting period of the state law to all industries and labor unions whether they are interstate or intrastate organizations.

NO ONE WINS A STRIKE

There seems to be no argument that the Minnesota Labor Relations Act has paved the way to smoother relations between management and labor. Nobody ever wins a strike, and the Minnesota Act, by providing for a cooling-off period, has given management and labor a definite opportunity to compose their differences. How many other strikes have been averted because of the operation of the Act is an open question, since merely filing a notice of intention to strike does not necessarily mean that such a strike would have taken place even had the Conciliator not stepped in.

Some labor leaders say the 10-day period simply gives the employer time to better his economic position, an opportunity he did not have when unions did not have to file a notice of intention to strike. Stock reply of employers to this contention is that strike notices do not *have* to be filed, that either party may petition the Conciliator to take jurisdiction of a negotiation before giving notice of an intention to strike.

Most criticisms of the Minnesota Act, however, center around its provisions concerning unfair labor practices. Unlike the Wagner Act, the Minnesota law defines unfair practices for employees as well as for employers. In Minnesota it is both unfair and unlawful to call a strike in violation of the Act's provisions; to conduct a sit-down strike; to picket any place of which the person involved is not an employee unless a majority of pickets are employees; to maintain more than one picket at any entrance to a place of business where no strike is going on; to interfere with motor vehicles belonging to persons not directly involved in a strike; or to threaten or coerce any person to join or not to join a union.

It is both unfair and unlawful for an employer to institute a lockout in violation of the Act; to encourage or discourage membership in any union by discrimination in hiring or firing; to spy upon employees; or to maintain a blacklist.

Because such violations under Minnesota law are declared misdemeanors, employers would like to see teeth put into the law providing more specific penalties for all violations, for industry and labor alike. They would also like a clarification of the law to provide for the granting of an injunction where unfair practices are threatened, to be applied, of course, against both industry and labor.

Such "teeth," however, would nullify the Act's emphasis upon *peaceful* settlement of disputes.

While agreeing that the labor relations law has worked out well in Minnesota, spokesmen for industry and for labor question whether it would work as well if applied on a national scale. Chief reason why the Act has met so little opposition is that its administration has been fair to both parties. It is questionable whether such an impartial administration would be possible on a federal basis, say Minnesotans.

To date all of the chief conciliators have been picked from the ranks of labor. They have enjoyed the confidence of union representatives in any negotiation. The importance of that confidence cannot be emphasized too much. These conciliators have tried to use as little compulsion as possible in getting two parties to agree.

A Minnesota fact-finding commission in session. Dispute in this instance concerns a wage adjustment question at Minneapolis-Moline Power Implement Company

What's more, Minneapolis had a background of ugly dissension between management and labor prior to enactment of the law. Mass violence, characterized by shootings, hand-to-hand encounters in the streets, and frequent sluggings brought death to many workers. Two strikes tied up the city for weeks. Labor leaders and heads of industry decided that matters had to change. When the labor relations law was finally passed, neither labor nor management wanted a return to that kind of industrial warfare. As a result, the emphasis throughout the operation of the law to find has been on finding peaceful solutions to any dispute, with or without state conciliation.

Such factors, intangible as they may be, are tremendously important from the standpoint of operation of the labor relations law itself.

GOVERNMENT CAN LEARN

On one point, however, the federal government can learn from the Act. The state's three-man fact-finding commissions represent the public, employers, and labor. The recent Presidential panels have had a preponderance of public members.

According to Dale Yoder, of the School of Business Administration of the University of Minnesota:

"No public representative can be expected to have a full understanding of the complex considerations that represent the position of either labor or industry in a serious dispute, nor can such a detailed appreciation be gained in a few hours of hearings . . .

"Fact-finding is a valuable device for the settlement of industrial controversies. Many disputes dissolve when the full facts are brought to light. But to achieve maximum effectiveness it must be conducted by a panel in which all parties have confidence and which merits such confidence by carefully regarding every contention of the disputants. The tripartite panel is best suited to this purpose. A purely public group can rarely meet its requirements."

In Minnesota, the fact-finding commissions have tended to become conciliation boards as well. They not only report the facts at issue to the governor, but make definite recommendations for settling the whole matter.

Here is another development. Panels limited closely to finding facts can occupy themselves without end on technical matters. What is involved in labor disputes is more often opinion than fact. The important part in the Minnesota Labor Relations Act, whether one talks about commissions or conciliation, is not fact finding; it is the opportunity management and labor have to get together and discuss their grievances before an impartial referee.

UNION-COMPANY CHART SOLVES GI SENIORITY

GEORGE W. TORRENCE • LABOR RELATIONS MANAGER, CATERPILLAR TRACTOR COMPANY, PEORIA, ILL.

Honorably discharged Caterpillar veteran applies for reinstatement, finds his job has been safeguarded. Chart (right) answers most of the seniority questions that are likely to arise

More than 3000 employees on military leave of absence have been reinstated without a single serious grievance or dispute at the Peoria, Ill., plant of Caterpillar Tractor Company. Conflicting court decisions indicated that liability under the Selective Service Act might be involved, but realistic appraisal revealed that solution of the problem could not await the outcome of a Supreme Court decision or possible congressional legislation. Returning employees rightfully expected to get back to work as soon as possible.

The record of this company's accomplishments, as well as methods used, may well be of interest to other concerns confronted with similar problems.

Fortunately, Caterpillar has not had any serious reconversion problem. A huge backlog of civilian orders has created a shortage of personnel to produce the products in demand. Nevertheless, serious problems were anticipated in returning veterans to their jobs or to jobs of "like seniority, status, and pay." From many job classifications, more employees had left for military service than there were jobs available.

At the outset, it was recognized that successful solution of the problem could best be accomplished through complete understanding with the union.

Periodic meetings were held with union representatives. Problems arising through the absorption of returning veterans were frankly discussed. Early in these discussions it became apparent to both company and union that the application of super seniority was not feasible and could result in the displacement of many long-service employees by veterans with less seniority and experience.

If possible, veterans are reinstated in their former jobs. Where this policy conflicts with established rights of employees who have longer service, every effort is made to resolve the conflict on a realistic basis by weighing the relative equities and, if necessary, by placing the veteran on a comparable job.

Seniority provisions of the union agreement provide for seniority by 16 major groups into which the factory has been divided. Employees transferring from one group to another continue to accumulate seniority in their old group for a period of six months, after which time this is traded for equivalent seniority in the new group. Object of this provision is to prevent employees who are being downgraded from bumping employees in other groups. It was considered desirable to adhere closely to this practice in the reinstatement of servicemen.

It also became apparent that a written understanding with the union would be advisable. Recent court decisions, especially the Second Circuit Court ruling in the case of Fishgold *versus* Sullivan Drydock & Repair Corporation, indicated that the issue of super seniority *versus* straight seniority was rapidly coming to a head and would be resolved by the U. S. Supreme Court. Fortunately, the circuit court decision in this case supported the views of the company and the union with respect to the impracticability of super seniority and gave both parties some assurance that they were approaching the problem in the proper direction.

As a result of discussions with the union, a five-part chart has been prepared. The chart simply and clearly portrays Caterpillar's approach to the problem of reemploying the veteran. Approximately 2000 copies of the chart have been reproduced and are now in the hands of supervisors and union representatives. It is believed the chart's use will permit the company to absorb large numbers of returning veterans with minimum difficulty. Liability under the Selective Service Act is not eliminated, but with both union and company approaching these questions on the same basis, the possibilities of liability are greatly reduced.

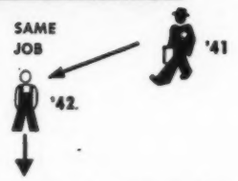
Once a veteran has been reinstated, seniority provisions of the union agreement are in effect, and his status, the same as that of any other employee, may be changed in accordance with terms of the agreement.

The company believes that handling of the problems in accordance with the principles given here, and in the accompanying chart, provides a satisfactory balancing of the equities of both veterans and non-veterans. It is expected that all servicemen can be absorbed in this manner. Only the possibility of a complete reversal of the circuit court decision in the Fishgold case stands in the way of a harmonious solution of the sometimes difficult veteran reemployment problem at Caterpillar Tractor Company.

How Seniority Affects Reinstatement of Veterans

The following chart outlines the general principles to be observed in reinstating an employee who returns from military leave of absence. Once the employee has been reinstated in accordance with these principles, the seniority provision of the agreement will apply

PRINCIPLE NO. 1



Returning veteran displaces employee with less seniority

This is the most desirable means of returning the veteran to his former job classification. If possible, therefore, the veteran should be returned in this way

Possible exception: If shorter service employee was on job at time of veteran's departure for service, refer to principle V

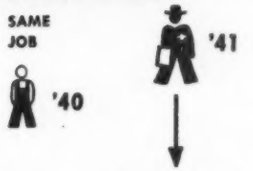
PRINCIPLE NO. 2

Returning veteran displaces employee with more seniority

A returning veteran will displace an employee with more seniority under the following conditions:

1. If the employee with more seniority was upgraded to the job during the absence of the veteran, or
2. If the employee with more seniority was transferred to the job during the absence of the veteran to fill an opening

PRINCIPLE NO. 3

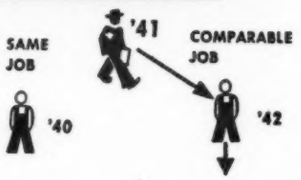


Returning veteran does NOT displace employee with more seniority

A returning veteran will not displace an employee with more seniority under any of the following conditions:

1. If the employee with more seniority was on the job at time of veteran's departure, or
2. If the employee with more seniority was downgraded to job during veteran's absence, or
3. If the employee with more seniority was transferred to job during absence of veteran in lieu of layoff or downgrading

PRINCIPLE NO. 4



Returning veteran displaces employee with less seniority on comparable job

If returning veteran cannot displace employee on same job, then veteran may displace employee with less seniority on comparable job, provided the veteran is able to do the comparable job

Under no circumstances may a returning veteran displace a senior employee from a comparable job

PRINCIPLE NO. 5

Returning veteran displaces employee with more seniority, rather than employee with less seniority

This occurs when employee with less seniority was on job at time of veteran's departure for service, whereas employee with more seniority was upgraded to job or transferred to job to fill an opening during the absence of veteran

If employee with more seniority had also been on job at time of veteran's departure, had been downgraded to it, or had been transferred to it in lieu of layoff or downgrading, then veteran would displace employee with less seniority, even though employee with less seniority was on job at time of veteran's departure

DEFINITION OF TERMS AND SYMBOLS

Denotes returning veteran. Figure denotes seniority date of veteran

SAME JOB — Same job denotes same classification of work, not identical machine or location

Figure denotes seniority date of employee on job when veteran returns

COMPARABLE JOB — Different classification of work, but upon which same rate can be earned

UPGRADE — A promotion or advancement to a job upon which a higher rate can be earned. (Doesn't necessarily involve a change in rate)

DOWNGRADE — A demotion to a job upon which the same rate of pay cannot be earned. (Doesn't necessarily involve a change in the employee's rate)

TRANSFER — A parallel move from one job to another

ORDERLY STORAGE OF SPARE PARTS CUTS PRODUCTION DELAYS

A. W. McAULY • ELECTRIC SUPERINTENDENT, EDGEWATER STEEL COMPANY, PITTSBURGH

Six basic principles, applied to the storage problem in Edgewater Steel's electric shop, insure instant availability of spare parts in a wide variety of sizes, minimize production delays:

1. Keep all parts in sight—instantly available without disturbing other parts.

Stocks need not be large. Often only one part need be kept on hand.

2. Provide each item an especially designed place in a hanger, on a shelf or bracket made for the purpose.

Use slanting shelves to keep parts visible. Arrange parts properly for convenient use.

3. Provide suitable facilities for lifting and moving heavy parts.

Vehicles of various shapes and sizes are needed. Smooth aisles and walkways are required.

4. Classify and store material in a particular location.

Divide the shop into specific zones and number them. Catalog classes of material together with zone location number. As material is expended, new parts are ordered from the storeroom and are charged to equipment where material is ordinarily used.

5. Avoid use of storage space as working area, or *vice versa*.

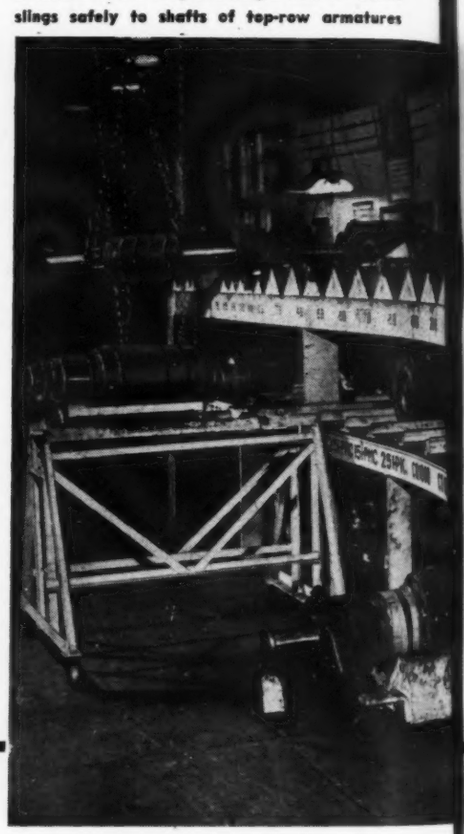
Use working spaces only for material in process of repair. To work safely and efficiently men must be free to move from one place to another within their working zone without having to step over material lying in their path.

6. Plan the storage area carefully in order to save space.

Shipping departments have learned the value of "nesting" and parallel arrangement of parts to conserve package space. The same general principle applies to good advantage in shop storage.

Special facilities developed and techniques used in storing and handling such items as armatures, cables, bearings, control parts, pinions, gears, tools, and motors are described in this article.

Three ways of handling armatures are shown. Rack has a rear step enabling a man to attach slings safely to shafts of top-row armatures



ARMATURES

For handling armatures, a 5x15-ft. rack was designed. From it, one man can safely and quickly remove any armature. In conjunction with the rack, an armature buggy is used, designed to accommodate, without adjustment, armatures of any size, and protect the windings and commutators while in transit. A hoist for lifting heavy armatures sweeps over top deck of the rack.

Each of the larger and medium-sized armatures is stored on a special wheeled cradle. Those for the largest armatures are made of wood. Cradles for the medium-sized armatures are made of sheet steel. Casters on the large cradles are swivel type, so cradles may be rolled in any direction.

Armature carriers stored on the second deck of the rack are guided so they will roll only in a straight line.

Larger armatures are rolled out from under the second deck of the rack and are wheeled under an overhead crane, which places them in a transport truck.

For armatures on the top deck, a portable carrier was designed to match up with angle rails on which cradles rest. A simple locking device attaches carrier to rack while armature is being run out, or in.

Along the top deck of the rack are wooden V-blocks of different sizes running crosswise. In these V's are placed the smaller armatures.

Frame of the rack is made entirely from standard angles, arc welded. Stored armatures may be readily examined, and bearings or pinions changed without trouble. Each armature has its own location.

BEARINGS

Bearings constitute quite a problem in an old plant. Designs change radically and frequently. In the course of only a few years motors and other equipment are received with new-type bearing housings. With the older machinery, open-type sleeve bearings predominated, while at the present time the antifriction type is common.

Spares of all types must be kept on hand if serious delays are to be avoided. At one time in the Edgewater electric shop, there were more than 600 different bearings.

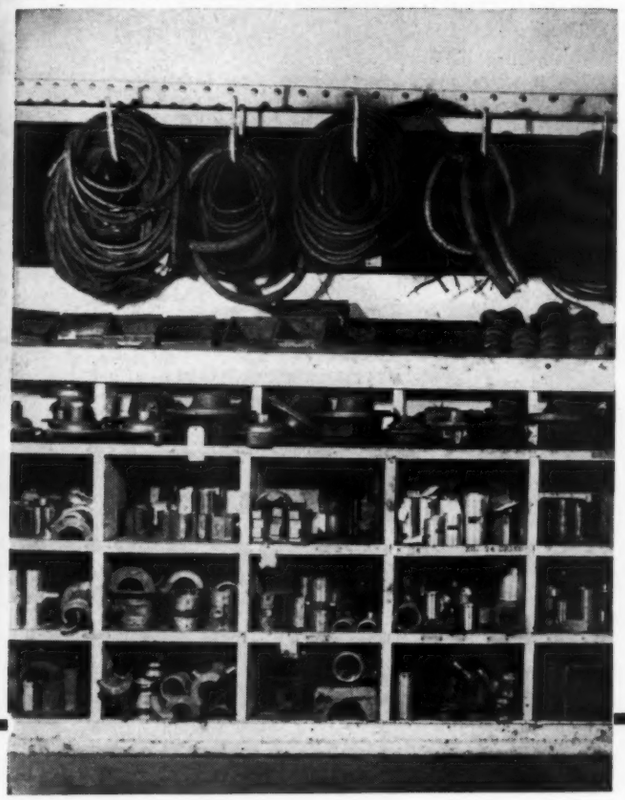
The larger bronze MCB and sleeve types are stored in open, front bins just large enough to take each size, the bins having been painted white inside to provide a contrast between the bearing and the bin wall. White paint is used generously where artificial lighting has to be used, because it adds much to lighting efficiency.

Medium-sized sleeve-type motor bearings are stored on a flat shelf about waist high and arranged in rows, graded according to type and size where they are instantly available.

Housings of antifriction bearings also are stored on a shelf in similar fashion.

Antifriction bearings are stored on a pylon similar to those carrying coils and control parts.

Sleeve-type bearings are stored in open bins. Interiors of bins are painted white, which makes it easier to see what is in them



Cables of various sizes and lengths are made up and labeled for instant availability when replacements are needed

CABLES

A considerable quantity of steel hoisting cable is used by the Edgewater electrical department, principally on overhead cranes. Various sizes and lengths are needed. Delays are saved by having cable coils of the necessary size and length instantly available. Cable lends itself to storage in a vertical plane. Coils are tagged as to size and length. They are wound with a standard inside diameter, so that they will fit a knockdown-type "reelbarrow."

The reelbarrow is a metal drum made in two parts, which telescope together to form a spool. A frame is formed of pipe in such a manner as to allow the drum to be raised from the floor, and to support it in free reeling position, after it has been rolled to the point of use. Cable is kept clean and replacement time is saved.

Trolley wires are made up in exact lengths and fitted with strain insulators, hook bolts, and nuts. When a trolley wire breaks, the whole thing is removed from the crane and its spare installed in a few minutes. The old insulators and hook bolts are used to make up a new spare, which is hung in its proper place. A list of trolley wire lengths for the several cranes is kept in a frame in plain sight for the information of the shop men in making up new sets. The lengths given are from one angle support on one end of the crane to the angle support on the opposite end of the crane—a distance that does not change and therefore provides a reliable guide.

CONTINUED ON NEXT PAGE

CONTROL PARTS

Control parts are stored on revolving pylons, studded with metal pins to allow the parts to be hung in plain view. The revolving feature takes best advantage of light conditions. Bases of the pylons are on wheels, allowing for shifting around and for cleaning the floor underneath the base.

Controllers, when brought in for repairs, are placed on a low, wood buggy. This buggy, mounted on four casters, has toe boards around its edges to prevent controller from sliding off. Most repairs may be made without removing controller from the buggy.

Drums and finger boards for drum control are stored on a tapered rack mounted on casters. Each drum has its own stall. Face plates are hung on wall spikes.

Coils, if large, are stored in open shelving. If small, they are hung on revolving pylons, the same as the controller parts. In the average plant there is a large number of different coils that must always be kept on hand as spares for magnetic starters and controllers.

New coils are purchased from nameplate data, or are rewound, using the defective coil for a guide. When needed, it is quicker to select the proper coil from a pylon—where coils are arranged in plain sight and marked carefully to complete the identification—than to have a stockroom clerk select the right coil from a printed list.

Pylons hold control parts, coils, ball bearings. White tags are placed on okayed parts, red ones on parts needing repairs

PINIONS AND GEARS

Pinions are graded and stored according to pitch and number of teeth. If a new one like the one wanted is on hand, it is almost instantly available. Stocks are checked easily. Sometimes bores may be changed to suit the need. If too small, bore is enlarged; if too large, it can be bushed with a steel sleeve welded into place by a bead around each end of the sleeve, which is tapered to take the weld.

To digress somewhat, the Edgewater electric shop has found a solution for one problem involving large non-metallic pinions. Replacement costs were high and delays too long because of time lost in changing pinions. They had to be fitted tightly to their shafts to prevent loosening in service. Each motor shaft was fitted with a steel sleeve, or quill, with four keys 90 degrees apart—running the necessary length and spot-welded in place. On one end of the quill is a shoulder, and the other end of the quill is threaded to take a ring to be drawn up against the end of the pinion. Pinion bores are enlarged and fitted with four key seats 90 degrees apart. Bores are made large enough to allow the pinion to slip into position easily. The locking ring is fitted with four heavy setscrews, which are set up tight after the pinion has been drawn into place with the ring. Replacement time has been decreased from several hours to an average repair time of 20 minutes. Pinion life has been increased by a noticeable amount also, since there is no distortion or damage to the new pinion during installation.

Loose gears are stored on the floor under shelves on which lighter material is kept. Gears are rolled in with their edges or teeth exposed, making it easy to remove one without disturbing another. Gears are tagged showing where they may be used. The method used follows the general principle that the heavier the object, the nearer it should be stored to the floor.

Storage of pinions, gears, brush holders demonstrates principle that the heavier the part the nearer it should be to the floor

Tools are stored on a specially built tool board, in plain sight. A color code identifies tools belonging to different departments

TOOLS AND MOTORS

Sledges, bars, wrenches, jacks, wedges, heavy wrenches, pullers are hung on a tool board in plain sight. A missing tool is readily indicated by a vacant space on the board. It is a good idea to color code special tools, each department having its own color scheme. Then any helper or laborer can restore a mislaid tool to its proper place.

A special feature of the tool rack enables a helper to select a wrench or bolt of the proper size. A row of nuts of the various sizes used is spot-welded to a plate on the rack in such a way as to allow a bolt to be screwed into a nut or a wrench to be tried on a nut for fit. Sizes are marked opposite each nut.

For the smaller personal tools, metal boxes on casters provide good storage.

At the same time, these boxes—which have a drawer lock—make tools readily available for use at the shop job. A flange around the box carries tools in the open while a job is being done.

Complete motors in a variety of sizes, speeds, and voltages are kept on hand for spares and for emergencies. They are stored in rows on the floor in an area served by a traveling I-beam crane. Each motor has a plant serial number plate, which allows a card index system to be kept. This card shows the entire plant history of any individual motor, as well as all its characteristics.

Converted core oven keeps bolts and washers in order. Excess bolts from repair jobs are sorted and stored for ready use

MISCELLANEOUS

Breakage and loosening of bolts and other parts, especially in connection with crane operation, is the largest single item of maintenance in the Edgewater electric shop.

As a general thing, when bolts or screws were needed for a quick repair job, the procedure had been to send a helper to the storeroom with an order for the items wanted. Often too many bolts were ordered just to be on the safe side. The excess was thrown into a junk box. To improve on this method, an old core oven with swingout shelves is used. Spare bolts, properly sorted, are kept in this converted core oven. Sizes are marked on the front of the shelves.

For test runs on motors and for other shop tests, enough equipment should be provided so that it will not be necessary to run any wiring that will have to be removed after the test. A much quicker method is to have the control permanently mounted and connected, and flexible enough to allow current control at various voltages. Heavily insulated flexible cable with snaps allows connection in a few seconds for the test, and it can be coiled up on a hook out of the way afterward. Protective devices, of course, are provided for safety. Meters are provided to indicate current and voltage values.

Resistance banks are stored on shelves and in racks just deep enough for one bank. Long narrow frames are stored in pockets made to take frames endwise, each one without disturbing another. It is a mistake to have shelves too deep—they invite disorderly storage, and units become interlocked so that a single item may not be removed easily.

Grids are stacked on hangers especially designed to receive them. They can be inventoried at a glance. It is not necessary to have two places for one part. Each has its place and is stored there whether it is in good condition or not.

AIMING MILLWRIGHT TRAINING AT LOW-COST PRODUCTION

RICHARD B. CRIBBS • TRAINING DIRECTOR, WYMAN-GORDON COMPANY, HARVEY, ILL.

Targets at Wyman-Gordon are less downtime, lower maintenance costs. Result: A direct hit on low-cost production. To which add safer operation and better supervision

Originally developed to meet the need for better and safer maintenance of its forge shop production machinery during wartime man-power shortages, the millwright training program at Wyman-Gordon Company, Harvey, Ill., has proved to be of equal value in reducing maintenance costs, and therefore contributing to a lower unit cost of product.

This training program was launched more than two years ago when labor turnover was high, trained men were almost impossible to get, and it admittedly required four to five years to develop a good all-around millwright. In consequence, new men took longer to repair machine breakdowns, involving costly downtime. Lack of confidence and skill, plus anxiety to make a repair as quickly as possible, caused a rise in accidents.

After one year of millwright training, the following gains were realized:

1. Maintenance labor turnover was slightly more than halved.

2. Non-disabling accidents to millwrights, and resultant lost time, were reduced by 56 percent.

3. Downtime on production units was reduced by one-fourth on the most frequent repair problem—the change of the piston rod of a steam hammer—and significant time savings were effected also in making changes of its two greatest wearing parts, sow block (lower die seat) and ram (moving part of hammer which holds die and strikes blow).

4. Wastage of most frequently used small replacement parts was reduced by one-fourth.

The millwright training program was part of a general program whose overall objective was cost reduction by emphasis on better utilization of manpower. High maintenance costs had always been a bug-a-boo in this type of industry, and therefore promptly came under the scrutiny of management when looking for whatever possibilities could be explored for cost improvement.

A further study brought out the facts that forge shop units, such as drop hammers, trimmer presses, and upset machines, were frequently operated until they actually were stopped because of breakage or badly worn parts. Added time was lost through lack of replacement parts or because of impaired efficiency by the use of improper and ill-fitting parts in the place of correct ones. Poor machine alignments caused extra stresses and strains in machine operations, and contributed to further unnecessary wear and damage.

These facts led to the conviction that the maintenance millwrights needed to be instructed not only in the functions and material specifications of all the parts of production machinery, but also in the best techniques of spotting and correcting improper conditions. Furthermore, a preventive maintenance procedure, based on scheduled frequent inspection of equipment by men trained to discern defects, could then be installed as the final step in keeping breakdowns to a minimum.

The need for and general objectives of a maintenance training program were thereby conclusively demonstrated.

Top management, when consulted, felt that some consideration should be given to a definition of responsibilities of the maintenance millwrights as a means of clarifying their position in the productive organization. Departmental heads and foremen suggested some attention to explanation of materials handling techniques, use and care of tools, necessity for teamwork and cooperation, function of gang leaders, and importance of job.

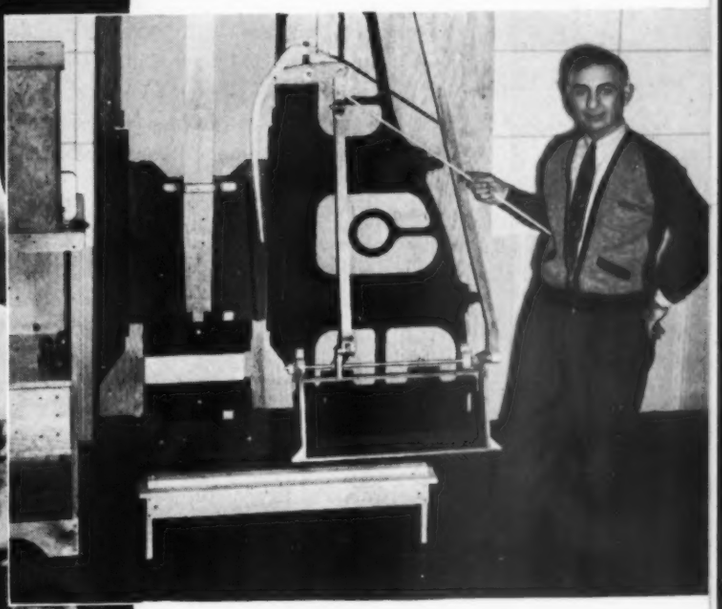
From the foremen, gang leaders, and the men themselves was obtained the need for recognition of the details of specific problems and assignments which faced them every day.

It was discovered that men at work level were interested in and anxious to have complete information on practical details such as the functions of steam hammer parts, over-all function of the hammer and other machines which comprise the hammer unit, what to look for in a hammer inspection, how to remove a sow block or a ram, how to install a sow-block pin, how to drive a pulled rod, and logically, of course, how to install these and other parts.

In addition, these men wanted to discuss at great length the various related things which help to simplify the maintenance and repair operations. They wanted an understanding of standard crane signals. They wanted to know how best to utilize hooks, chains, eyebolts, cables, and drivers. They felt a need to brush up in arithmetic relating particularly to addition and subtraction of fractions.

WORKERS LIKE IT

Needless to say, these requests provided excellent material for a working outline of a practical training program. A significant outcome of this research was evidenced in the general reception to it by all people, in that both their attitude and interest were favorable in nature. They caught the idea that perhaps there were better, easier, and safer ways of getting things done, and became anxious to uncover them. They realized from the beginning that this was their program because they had an active part in its planning. Hence co-



Training program for maintenance millwrights has reduced downtime on steam hammers, which offered the biggest repair problem, by one-fourth within a year's time. (Inset) In the group-discussion class a woodworking model of a steam hammer was used to instruct men in the functions of the many working parts

operation in its application, always a major hurdle to be cleared in any training program, was assured.

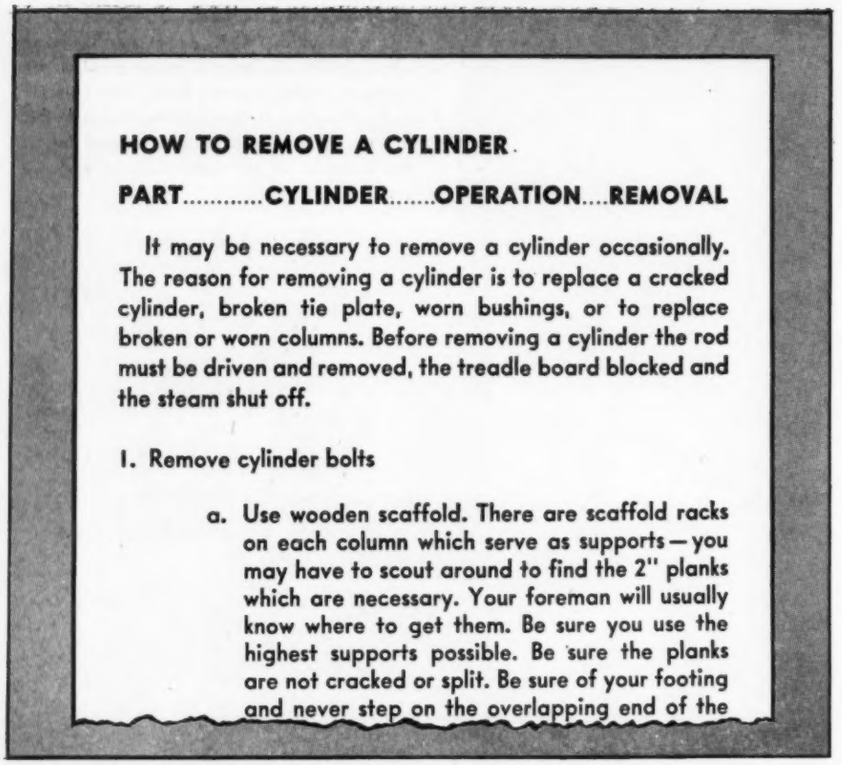
The material already assembled in the preliminary research was therefore organized for presentation by the method of group discussions. The maintenance crew was divided into six groups, each of which was scheduled for a 1½-hour session in the conference room one day a week during working hours. At these meetings the foremen responsible for the men's shop duties were made the group leaders. Under the guidance of the training director these foremen presented preplanned material and invited discussion in an informal atmosphere.

In presenting the material, models of machines were used, also regular tools, parts, and materials, for easy association with actual shop conditions. The real basis of the program, however, was a 52-page loose-leaf manual of letter size that contained all the detailed information needed by the men to fulfill the program's objectives. All this informational material was presented in mimeographed form, with occasional tabulations and sketches where needed.

Particular attention was given right at the start of the manual to the outline of contents, which showed 28 chapter divisions under functional headings effective not only for quick and easy reference, but also for stimulation of curiosity as to the text. Consider, for instance, such headings as "Importance of Work," "Cost of Broken Equipment," "How the Hammer Works," "Tools and Equipment," and "How to Remove a Cylinder."

In a one-page introduction, the manual defines as its threefold objective the desire to give each man (1) a working knowledge of tools and equipment, (2) inspection standards to prevent breakdowns, and (3) specific information on how to repair breakdowns. It then goes on to say: "The work is tough and it may seem very discouraging at times, but when you have acquired the skill and polish of this profession you are the possessor of a labor commodity that is of unquestionable value in the industrial world—in short, you have something that industry wants, and your future is assured."

Equally candid are the estimates of downtime costs of breakdowns (in the chapter intended to demonstrate the importance of good maintenance work) showing costs varying from $40 to $110



HOW TO REMOVE A CYLINDER

PART.....CYLINDER.....OPERATION....REMOVAL

It may be necessary to remove a cylinder occasionally. The reason for removing a cylinder is to replace a cracked cylinder, broken tie plate, worn bushings, or to replace broken or worn columns. Before removing a cylinder the rod must be driven and removed, the treadle board blocked and the steam shut off.

1. Remove cylinder bolts

a. Use wooden scaffold. There are scaffold racks on each column which serve as supports—you may have to scout around to find the 2" planks which are necessary. Your foreman will usually know where to get them. Be sure you use the highest supports possible. Be sure the planks are not cracked or split. Be sure of your footing and never step on the overlapping end of the

Sample page from manual given to each millwright illustrates with what detail instructions are given for making repairs as quickly and safely as possible on this company's production equipment —in this case, for removal of a cylinder from a steam hammer

each lost hour. So is the recital of replacement costs on broken equipment, varying from $700 for a piston rod of a large hammer to $35,000 for its base. Hexagon nuts "you use every day" are $3 apiece, and one sow-block key runs around $314.

Subsequent chapters define the function of the gang leader and point to his need for their teamwork and cooperation. The attitude of production hammer crews is explained as follows —"When you are fixing a breakdown, you are mighty welcome to them, but when you are suggesting a shutdown to repair an obvious defect you may not get such a good hearing—they are working on piecework and every minute means money to them. If you get the opportunity, you can indicate that it might be to their advantage to take the time now rather than waste more at a later date."

Almost five pages are devoted to problems illustrating the principles of addition and subtraction of fractions. Obviously, elimination of errors in calculation after accurate measurements of machine parts have been taken is a highly important prerequisite to the success of the finished repair job.

Other sections cover information on hooks, chains, eyebolts, and cables—how to use, capacities, precautions, and safe loads of double sling chains and wire rope. Each millwright is told what tools he should possess, what tools the company furnishes, where they can be gotten, and what their use and care should be. Crane signals are illustrated.

Safety is featured in three pages, telling the worker what precautions to observe for overhead work, use of cranes, ladders, tools, and equipment, and personal protection.

About nine pages describe the functions of the various production machines in the shop. These are further broken down for hammers, which are by far the biggest maintenance problem, as to names and functions of all their major parts.

The balance of the manual devotes some 20 pages to telling how the hammer works, what to look for in a hammer inspection, and how to make a complete inspection. It concludes with detailed instructions on how to change parts, such as a piston rod, cylinder and sow block. On the last page the millwright is reminded of the impossibility of including everything in the manual, and is encouraged to consult his supervisor in all matters affecting his employment.

Without proper follow-up on the job, however, to implement the information given the men in the manual and obtained in the conference groups, it was felt the best opportunities for improvement would be wasted. Realizing this, the following six shop applications were made, arising in part from suggestions of the men themselves:

1. Work of the maintenance crews was reorganized so that each man knew what he should do in any major repair operation.

2. Check lists for use in daily inspections were developed, to prevent oversight of any functions or parts, and their completion was checked daily.

3. Work crews were divided into groups of six to eight men, with a gang leader in charge. Daily meetings of gang leaders were held in the shop office, for review of various problems and jobs by supervisors in an attempt to coordinate them with the material covered in group discussions.

4. New tool and equipment stations were set up in out-of-the-way places in the shop to save time in getting needed material.

5. More complete on-the-job instruction was provided. All the major jobs were broken down into simple steps, and the gang leader was held responsible for training his crew.

6. One man on each shift was made responsible for seeing that all tools and equipment were in good repair and available as needed.

The training program, while aimed at the millwright, also benefited supervision. Maintenance foremen profited through the enforced increased contacts with their men and thereby gained a better understanding of their needs. Supervisors were made aware of the possibilities in quantity and quality of work by application of sound instruction practices, which realization removed fear and uncertainty in the men, and reduced labor turnover. By the same token, the weaknesses and strengths of individuals were more clearly revealed and able to be dealt with constructively. In short, a feeling of understanding between supervisor and worker was created that had an intangible yet undisputed influence in reaching the goal of better maintenance and improved production.

ONE-CARD GRAPHIC SYSTEM FOR CLOSE CONTROL OF MATERIALS

N. N. BARISH • INDUSTRIAL ENGINEERING DIVISION, RCA VICTOR DIVISION, CAMDEN, N. J.

Production costs have been reduced. parts and materials are expedited efficiently and in advance of floor requirements, and all information needed for logical and economical control of production is immediately available since the adoption of a visual record system at RCA Victor.

The problem, as put up to the industrial engineering department was this: Design a production control system that will provide, on a single record and at low cost, an over-all picture of the progress of production on each shop order and also the details of the status and the operations of each part and subassembly.

That was the assignment. The following conditions presented obstacles to a successful solution:

1. The units being manufactured are exceedingly complicated. There are approximately 1000 different parts and component assemblies to be assembled in the average electronic equipment. At any given time, from 100,000 to 200,000 different parts are being used in assembly operations on all units.

To illustrate the size and complexity of the equipment, a picture of a frequency modulated transmitter is shown at the right. This transmitting unit is typical of the electronic equipment whose production is under consideration in this article.

2. A vast number of engineering changes are made; on a shop order of 5000 parts, more than 5000 engineering changes may occur.

3. The quantities on order may be revised.

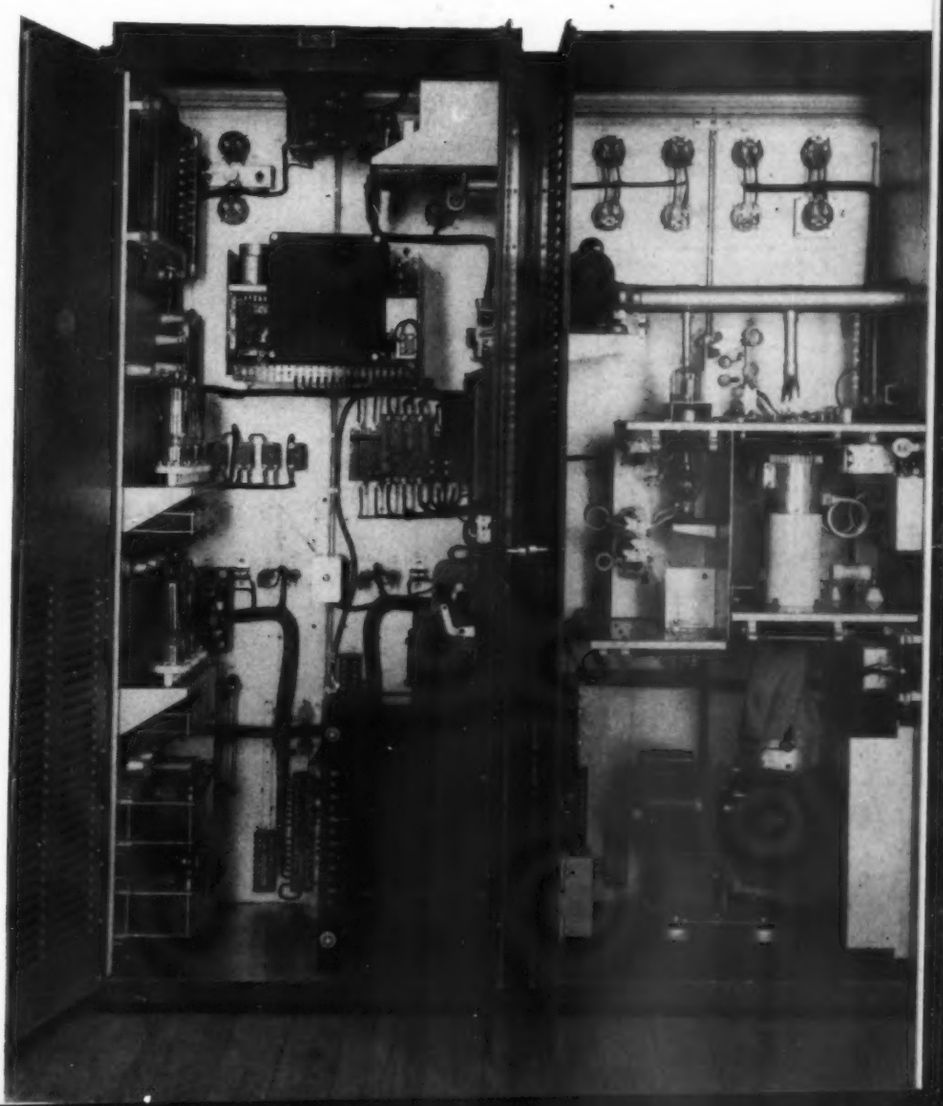
4. Schedules are frequently changed, sometimes because of changes in the customer's order, often because of purchasing and manufacturing difficulties.

5. All stock in the assembly stockrooms is charged to, and segregated by, work-in-process shop order accounts; hence, all transfers of stock between shop orders must be recorded.

A control system was desired which would make it possible to expedite scientifically the procurement and manufacture of parts and component assemblies prior to the time they were needed on the assembly floor.

To solve the problem, an entirely new record-keeping system was designed. The form used in this system (illustrated on page 151) was named the "shop order status record."

Information as to raw material, sources, and manufacturing is placed on the reverse side (shown on page 150) of the shop order status record by the equipment ordering group of the planning department prior to the start of production. This information is first typed on a duplicating master and the required number of copies are made on material ordering cards for the necessary ordering and manufacturing dis-



Magnitude of the materials control problem at RCA is indicated by the complex type of equipment made. For example, the frequency modulated transmitter shown here requires more than 1000 different parts and component assemblies

tribution. The duplicating master is then used to place this same information on the shop order status record, thus eliminating the cost of any manual transcription of the information.

There is a scale on the top of the status card, labeled from zero, at the right, to the total number of equipments to be built, at the left. This scale is in easily divisible figures, such as multiples of five or ten, so that the entire scale is not used in all cases. The scales for each shop order are placed on the cards by a reproducing machine.

A movable tab is placed along the scale on the top of the card. The tab is kept at all times so that the reading at the left of the tab equals the total number of units that can be made with the total number of the parts received in the stockroom. The total number of units is obtained by dividing the balance of the "receipts" column of the status record card by the number of times the part is used in the equipment (pieces per equipment). The tab position is kept to an accuracy of one-half a scale division.

Tabs of different colors are used to distinguish the various types of parts used in the equipment. A light blue tab indicates the status of a purchased part; a light red tab indicates a manufactured part; and a black tab represents a component assembly.

Shop order status record cards are segregated by shop order and filed in numerical order by part number.

To provide status information required for proper shop order control and expediting, all material transactions are posted to the card so that:

1. The balance in the "receipts" column represents the total quantity of the part that has been received in the stockroom and can be, or has been, used in the assembly of units.

2. The balance in the "disbursements" column represents the total quantity of the part which has been disbursed for assembly and can be, or has been, used in the assembly of units.

When material is received from a vendor or from the fabrication department, a posting is made to the "receipts" column. The quantity received is posted in the upper space provided and a summation is made of this quantity and the previous balance to get the figure for the lower space, which represents the total received to date. A running total of receipts is thus maintained.

Disbursements of material to the assembly floor are recorded in the "disbursements" column of the status card. The quantities sent to the assembly operations are posted in the upper spaces provided, and a running total of disbursements is maintained, in a manner similar to the "receipts" procedure.

The quantity of any part in the stockroom bin at any time is the difference between the totals in the "receipts" and the "disbursements" columns.

Routing	N.P.A.	1 to 10	11 to 50	51 to 100	101 to1000	1000 up	Finish	Drawing No.
40	Name Frame						0	255446-4

Material Description	M. L.	Min. & Max.
.051 x 6¼ (36 x 96) PS 442 A1 ½ hard Shear F.S.	29¼	2-3
	For Accounting Only	

Contract	S M. #	Wt. per Piece	Pcs. per Equip.
W-98-072-r1-1763		3	2

Shop Order	Card No.	Reference No.	Assem. Div.	Amt. Req.	Mfg. Amt.	Source	Quantity	Date Wanted	Issued by Date
14056	1764	255746-501	144	4500	4530	107 R7462	5743 ft.	7-1-45	rls 5-22
Code									

Vendor	Del. to Bldg.	F. O. B. Point	Method of Shipment	Delivery Date	P. O. Number

Dept. Code	Terms	Confirming to	Price	Commodity Code

Reverse side of the shop order status card. Here the equipment ordering group of the planning department enters information about raw material, sources, and manufacturing of the units

PARTS MAY BE BORROWED

Often the same part is used on two different units. It may happen that the part is required but unavailable for use on unit *A*, and is available but not then required for use on unit *B*. The natural and logical thing to do is to borrow, or "divert," the part from *B* to build *A*. However, the part must be returned to unit *B* by *A* expediters in time to meet *B*'s production schedules.

Experience has proved that unless special provision is made for accurate recording and diligent follow-up of "diversions," unit *A* expediters may fail to return the parts on time. A separate section of the shop order status record was therefore designed to insure that all open shop order "diversions" may be readily ascertained at a glance.

For instance, when unit *A* borrows 128 parts from unit *B*:

1. Unit *A* receives 128 parts. This quantity is posted in the "receipts" column of the equipment *A* card in the standard manner. In addition, the date, ticket number of the diversion paperwork, and the date of promised return are placed, in *red*, in the "diversions" section of the card. Also a yellow tab is placed on the card to flag the diversion.

2. Unit *B* disburses 128 parts. These parts, however, are not disbursed for assembly, and will not be available for assembly of *B* until they are returned by *A*. If this transaction is posted in the "disbursements" column of *B*'s shop order status record, the balance in the "receipts" column will be greater than the quantity that can be used in the assembly of unit *B*, and the balance in the "disbursements" column will be greater than the quantity that has been disbursed for assembly.

This transaction is therefore posted in *red* as a negative quantity in the "receipts" column, and the quantity is

SHOP ORDER STATUS RECORD

RECEIPTS

Date	Ticket No.	Amount	Date	Ticket No.	Amount
6-2	MFT 437894	732	Bal.	Brt. Fwd.	
6-30	MFT 516472	307			
		1039			
7-4	DT 76432	350			
		689			
7-18	CMR 376412	56			
		633			
7-22	MFT 538375	426			
		1059			
7-29	MFT 544617	325			
		1384			
8-2	DT 80659	350			
		1734			
8-7	MFT 556478	28			
		1762			
8-16	MFT 563117	954			
		2716			

DISBURSEMENTS

Date	Ticket No.	Amount	Date	Ticket No.	Amount
7-10	AS 364761	600	Bal.	Brt. Fwd.	
7-18	CMR 376412	56			
		544			
7-19	MR 564728	56			
		600			
8-10	AS 395756	900			
		1500			

DIVERSIONS

Date	Ticket No.	Date Prom.	Date Ret.
7-4	DT 76432	8-4	8-2

Fin. 0 Part No. 255446-4
Name Frame
Req. 4500 Pcs. per Eq. 2
Loc. F-9 Source 40
Card No. Ref. No.
Amt. Ord. Ref. No.
Date Want. S. O.
M. R. No. P. R. No.

2200
2000
1800
1600
1000
800
600
400
200
0

A quick glance at the shop order status record gives complete details about materials. If parts are "borrowed" for another unit, they are subtracted from "receipts," added again when material is returned. There are no stoppages for want of parts

subtracted from the previous balance to get the new balance. This procedure maintains the balance in the "receipts" and "disbursements" columns so that they represent the production status of unit *B* in accordance with the previously established definitions.

The date, ticket number, and date of promised return are recorded, in black, in the "diversions" section of the card.

WHEN REPAYMENT IS MADE

When unit *A* repays *B*, the postings are exactly reversed. A negative receipt is posted to the status card for unit *A* and a positive receipt is placed on the status card for *B*. The date of return of the borrowed material is posted beside the original entries in the "diversions" sections of the cards, thus closing the open diversion. The yellow tab is removed from *A's* card.

Whenever a part is scrapped, the quantity is posted in *red* in both the "receipts" and "disbursements" columns. From the point of view of the material status position of the shop order, when a part has been scrapped it is exactly the same as though it had never been received. It is therefore necessary to make two negative postings to balance out the positive "receipts" and "disbursements" postings which were made when the parts were originally received and disbursed.

The system of movable tabs provides quick visual information about the status of every part and component assembly needed to build the required units. The position of each tab on the status card scale indicates the number of units that can be, or have been, built with the available quantity of that part. By looking over the deck of cards for any given unit, it is possible to determine at a glance the number that can be built with the parts on hand. The number and status of the items limiting production of the shop order are thus graphically presented for quick and easy comprehension.

Shop order status record cards contain the complete details of all material control and movement information on each part and component. Comprehensive information on every part is thus available in one place. In addition, all unusual circumstances or occurrences affecting any part or parts are recorded in the spaces provided for remarks on the reverse side of the card. Here may be found information on vendor contacts and promises, fabrication department troubles and predictions, and so on.

Use of the status record system makes possible economical and efficient expediting of parts and material in advance of floor requirements, by revealing impending shortages of purchased or internally fabricated parts or component assemblies.

The schedule of future production is continuously compared with the material support picture presented by the status cards. If the schedule calls for production up to 350 units on the shop order during the next production period, then the parts represented by any tabs below the 350 unit line require expediting. Expediting energies can then be concentrated where they are most required and the most effective results can be obtained.

By advance expediting of impending material shortages and concentration of effort where it is most needed, the possibilities of a breakdown of the production line because of floor shortages of parts are considerably reduced, if not completely eliminated.

IMPROVED RECORD CARD

The design of the shop order status record card incorporates two improvements which tend to make for greater accuracy and for ease of auditing.

1. The double-entry system is used. Many factory and production control records still retain the traditional single-entry system. Although single entry methods still have their advantages for certain applications, accuracy is more easily maintained and the records are more amenable to checking when the double-entry technique is applied.

2. Postings and additions and subtractions are made on columnar ruled forms, with all the pertinent numerals ranged in vertical order. It is thus unnecessary to carry any figures by memory when performing the required arithmetical operations. By avoiding the common practice of placing summations and balances to the side of the last entry, rather than directly below it, the number of clerical errors is reduced considerably.

Shop order changes—in schedule, design, and quantity to be built—are readily handled under this production control system. A new production schedule requires no alteration in the records. To take care of a design change, status cards are added for new parts; taken out for obsoleted parts; and, for parts that have been redesigned but not changed enough to revise the drawing numbers, the processing information is changed on the status card. Finally, a change in the quantity of the equipment to be built necessitates no revision at all in the shop order status records.

This control system reduces production costs in many direct and indirect ways. The savings in assembly costs resulting from virtual elimination of production line shutdowns have already been mentioned. With the greater efficiency accompanying the scientifically controlled expediting already described, fewer expediters are required.

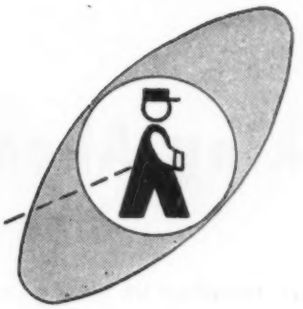
FAR LESS RECORD KEEPING

There is, moreover, a great reduction in the total amount of record keeping work. A single record serves the purposes of a number of records and reports previously required. Under the former system a stock record was kept of all receipts and disbursements; status charts were prepared and maintained to provide a graphic picture of the status of all parts and component assemblies; and status and expediting reports were prepared with information from the charts, stock record, purchase order follow-up records, and various other sources.

With the use of the shop order status record system, however, fewer reports are required because of the universal character of this record, and the labor for preparing the expediting and other reports that are still needed is considerably reduced. All the required information is on one card.

The shop order status record system has proved extremely valuable because it makes immediately and continuously available all the information required for logical, efficient, and economical control of production of complicated equipment. It has reduced to a minimum stoppages of assembly lines caused by lack of some critical item. It has reduced the number of clerks required to keep stock and expediting records. Expediting has been removed from the realm of crystal gazing and placed on a firm, scientific basis, with a resultant increase in performance and decrease in cost. Management and supervision know where they stand at all times, and, with all the facts at their disposal, can make intelligent decisions.

Looking Ahead in Labor



last-minute round-up as we go to press . . .

Reconversion wage gains under its belt, organized labor enters Phase Two of its post-war program, a period of intensive union organization. Phase Three will bring a second round of wage demands, beginning late this year.

In drives for more members both CIO and AFL proclaim and take credit for victory in post-V-J wage struggle. Swollen union treasuries are tapped. *CIO raises $1,000,000 for membership drive in South, ballyhoos it as "one of the greatest" in labor history. AFL counters with plans to enroll 1,000,000 in "the largest organizing drive in the South in the history of the trade union movement."*

•

Foremen and other supervisors have been declared fair bait for union organization. White-collar workers are being wooed more ardently.

John L. Lewis's return to AFL's "House of Labor" has revitalized other AFL unions, challenged the younger and more obstreperous CIO, and put the independent unions on their guard.

The stage is set for a real supremacy fight between Lewis and Murray. *Indeed, the battle is on, in the early rounds. Such rivalry breeds jurisdictional fights, headaches for helpless employers. Trouble can be expected in chemicals and textiles, pre-fabricated housing, garages, utilities, and among foremen.*

Rumblings of second round of wage demands will be heard late this year and come to a head after New Year's Day. Steel will take lead.

Nature of the demands will depend largely on what happens between now and then. *Probably won't be as much as the 18½c bite taken this year unless the cost of living skyrockets.* Labor will ask for increases to meet any increased cost of living, plus other concessions.

•

Leading demand, aside from a general wage increase, may be for some kind of guaranteed annual wage or other form of assured income. Health and welfare plans, sick benefits, severance pay—all adding to the security of the workers—are sure to be near the top of the union's list. The workers are hearing a lot about these things from the President, Congress, Lewis, the CIO. *Organized labor doesn't expect wages to fall as after the last war. Not even when controls against wage decreases are removed. Trend is other way. Upward.*

Emphasis on check-off is developing. At General Motors the CIO United Automobile Workers traded the maintenance of membership it got from the War Labor Board for automatic check-off. *It puts maintenance of dues—the treasury—above membership.* This also happened at International Harvester and Yale & Towne.

The compromise has this significance to employers: *While dues must be checked off for the duration of the contract, the employee is no longer obligated to maintain his good standing in the union; the union no longer may obtain his discharge for any reason. Even so, these agreements have provided for "escape" periods during which the employee may reject the check-off.*

There are some who expect the dues check-off eventually will be applied to all employees in a union's bargaining unit, non-members as well as members. This was ordered by an arbitrator at Ford's Windsor (Ont.) plant, and has since been agreed to in this country by Joyce, Inc., Pasadena, Cal., shoe manufacturer. Warwick Mills at Centerville, R. I., has agreed to check off (for charity) the amount of dues from non-members' pay checks.

We may see fewer wildcat strikes by UAW-CIO members. As head of the union's General Motors Department, Walter Reuther has an excellent record of discouraging illegal strikes. Ford has obtained an agreement to discharge "any employee found guilty of instigating, fomenting, or actively supporting, or giving leadership to illegal work stoppages." At Murray Corporation the union agreed to impose $1 fine (by check-off) against any worker who fails to ballot during a strike vote. *Charity will get the buck.*

•

Employers must look to the courts for the final answers on foremen's unions.

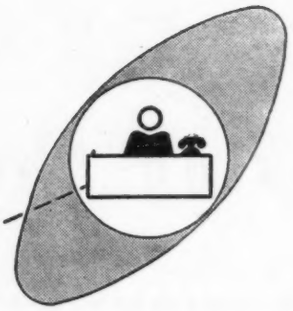
Through the Packard and Jones & Laughlin decisions the National Labor Relations Board reached the conclusion that foremen, and even higher supervision, are "employees" under the Wagner Act and have a right to choose any union to represent them.

The union may be CIO, AFL, or independent; it may be even the same union representing the production workers whom the foremen supervise. Anything goes.

What are the possibilities, then, in the organization drive? Production workers may strike to force their supervisors into AFL, CIO, or independent unions, wherever the former's interests may lie. Imagine the latent dynamite where AFL foremen supervise CIO workers!

If the courts uphold NLRB, we may see some changes in the whole supervisory structure of industry.

Looking Ahead in Business



last-minute round-up as we go to press . . .

Shortages dominate the business outlook. And don't be surprised if they continue throughout both 1946 and 1947.

Basic materials are short—1946 steel output will be at least 10 percent short of demand (and the coal strike widens the gap); lead supply is filling only half of current needs; lumber production may meet only 85 percent of 1946 requirements; tin will continue to be rationed. And it's the same story in almost all raw materials.

Basic materials shortages show up in shortages of finished goods. What's more, finished goods output has been dogged by components shortages—partly attributable, in turn, to lack of basic materials.

Once the effects of the coal strike have been shaken off, the outlook is for volume output of finished goods. Manufacturers have been piling up stocks of work-in-process bits and pieces and materials to support large-scale output. *This phase is about over and the next few months will see really large output of cars, refrigerators, washing machines, and all the things that spell peacetime plenty.*

This will take the edge off the backed-up demand for goods. But it won't solve the shortage problem. **The backed-up demand is so huge that only a small fraction of it can be filled this year and another small fraction in 1947.**

Some idea of the size of demand is gained from the fact that individuals and businesses now have over $225 billions of cash, bank deposits, government securities, plus the fact that individuals will receive income payments of some $165–170 billions this year.

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Watch the manpower situation closely in coming months. And don't be surprised if a real shortage develops after mid-year. A manpower bottleneck would intensify all other shortages and make it much tougher to avoid an inflationary boom. **What's more, it would set the stage for another round of sizable wage demands in late fall or early spring.**

Latest count of unemployment places the total at 2,710,000. Another 2,000,000 servicemen will be released by June, and some ex-servicemen who have been on vacation will go job-hunting. But some veterans will go back to school; and perhaps three-quarters of a million persons will leave the labor market. Net result will be a labor reserve of from 4 to 5 million workers.

Against this, we may have 5,000,000 job openings, in addition to the 53,000,000 employed in March. There'll be a big rise in construction employment as the housing program gets going; more workers will be needed in durable goods as large-scale production gets under way; textiles, lumber, and mining could use more workers; and a rise in jobs in all these lines will support higher employment in trades and services.

Shortage probably won't be as acute as during the war. Moreover, higher wages may draw back into the work force some of the persons who retired after V-J Day. But, at the very least, it will be a tight situation—skilled workers will be hard to find and workers will tend to shy away from low-paying and relatively unpleasant jobs.

•

Over-all industrial production, as measured by the Federal Reserve Index, stood at 169 (1935-39 average equals 100) in March, a new post-war high. In spite of the coal strike, the final figure for April will be only a few points below March. The steady improvement in non-durables and the upsurge in output of the metal-working industries will almost offset the effects of the coal strike on the index.

Production of consumers' durable goods continues to lag. Strikes, materials and components bottlenecks, and pricing difficulties are the explanations given. Radio sets and tires are the only major items where production increased in February.

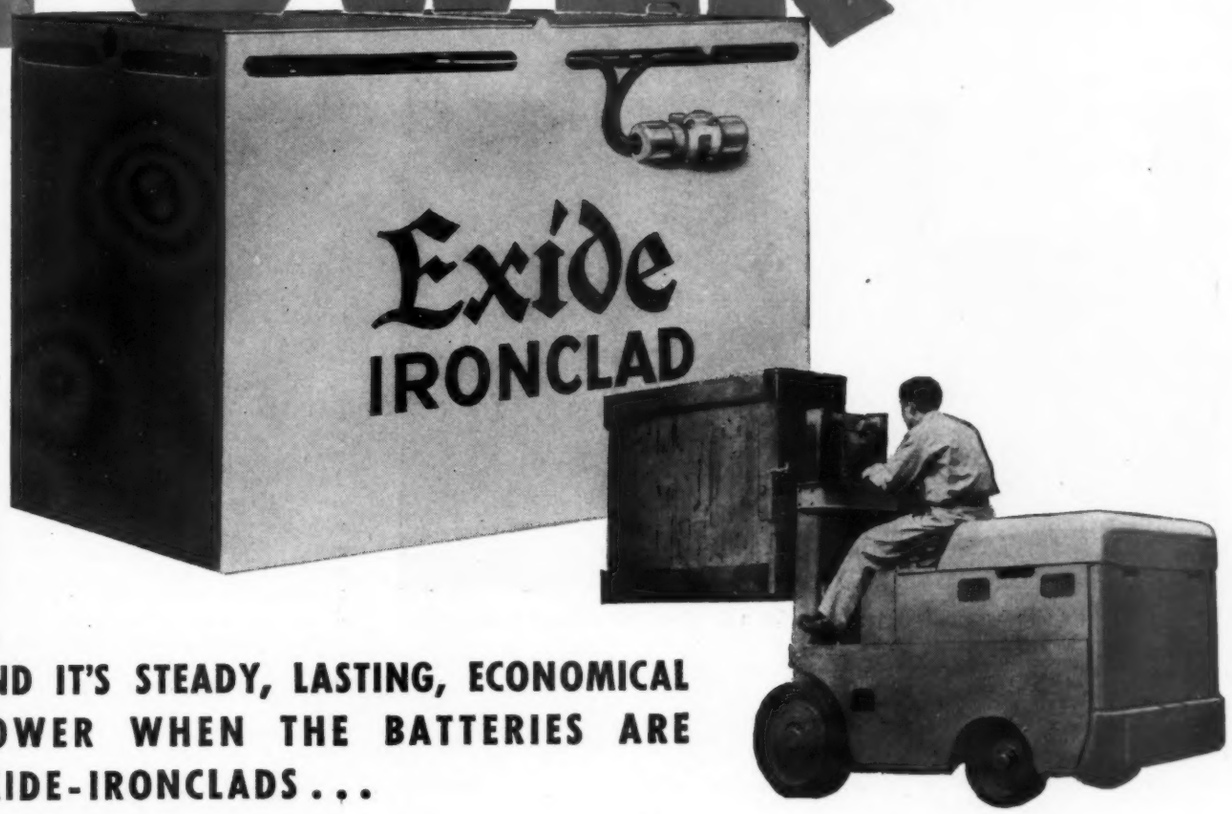
The steady employment increase in industries which were severely pinched during the war hasn't made the headlines. Taken as a group, ten important industries (lumber; stone, clay, and glass products; furniture; textiles; apparel; leather; tobacco; paper; printing and publishing; and petroleum and coal products) have added 500,000 workers since last September; that's an average gain of 2 percent a month. **Nevertheless, employment in these industries is 120,000 below the December 1941 level and still further below the number needed for all-out production.**

•

CPA's order limiting industrial and commercial construction will hit hard during the second half. Note that the CPA order doesn't cancel all industrial building. Work under way can be completed, and new work can be started if approved by CPA. *Local committees will have an important say in approving projects, and may approve industrial expansions necessary to create jobs even if this means cutting homebuilding.*

The top priority given to housing will increase very greatly the difficulty of carrying on industrial building. Effect will be to delay the breaking of bottlenecks which arise out of lack of capacity. This will accentuate the shortages that have been slowing industrial production.

DEPENDABLE POWER



AND IT'S STEADY, LASTING, ECONOMICAL POWER WHEN THE BATTERIES ARE EXIDE-IRONCLADS . . .

More and more, management executives are finding that Electric Industrial Trucks, powered by Exide-Ironclads, are the *right answer* to their materials handling problem. Numerous records prove that this efficient combination assures more tons per man per hour . . . and at lower cost, which means greater profits.

Exide-Ironclad Batteries deliver continuous service day in and day out for years. They have the *high power ability* required for frequent "stop and go" service . . . the *high maintained* voltage that constant lifting, hauling and stacking demands . . . and the *high capacity* needed to assure steady, day-long performance with full shift availability.

Write us for a FREE copy of Exide-Ironclad Topics which contains "Case Studies" of materials handling problems. It tells how to cut handling costs up to 50% . . . covers latest developments in handling materials from receiving to shipping.

Materials Handling offers one of the greatest opportunities for reducing costs and increasing profits, that are available to Management today.

ELECTRIC INDUSTRIAL TRUCKS POWERED BY EXIDE-IRONCLADS HAVE ALL THESE FEATURES . . .

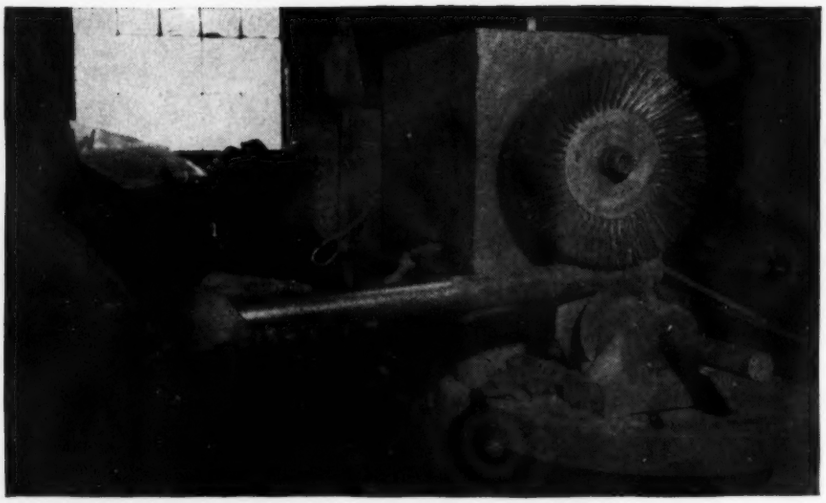
Inherently dependable
Built for long, hard service
Provide maximum safety . . . best working conditions
Fast handling and accurate spotting
Effective use of lowest cost power
Lowest overall cost

HIGHEST EARNINGS
GREATEST SAVINGS

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

operating shorts

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for



Cleaning old rusty pipe by wire brushes is returning a lot of critical material to use at The Builders Structural Steel Company, Cleveland

BRUSHING WHEELS RECLAIM PIPE AND TUBING

SOURCE: The Osborn Manufacturing Company, Cleveland

Pipe in various sizes and lengths is being power-brushed to a practically good-as-new finish at The Builders Structural Steel Company, Cleveland.

Depending upon the size of pipe being cleaned, combinations of two, three, four, or more wire brushing wheels with disk center are mounted on a spindle powered by a stationary electric motor. The wire wheels, of about 33-gage wire, revolve at a speed of 1800 r.p.m. Pipe is inserted between a roller mounted on the bed of the unit, and the operator moves the pipe back and forth about 10 to 12 inches at a time under the revolving brushes, rotating the work slowly to clean all sides.

The roller fixture is adjustable by turning a hand crank on the side, so that the pressure can be adjusted to remove all rust and scale deposits.

A long length of pipe is handled by placing it on adjustable roller dollies.

SUPERVISOR CONFERENCES ON "YOUR CHOICE" BASIS

For the fourth successive year, Caterpillar Tractor Company, Peoria, Ill., is offering supervisor conferences on a "your choice" basis. Conferences for 1946, described in a booklet distributed to all supervisors, are divided into three groups: Those that are currently being held and in which there is much interest; new conferences that will be organized if a sufficient number of persons on each shift are interested in the subject; and those that have been held in the past and that will again be scheduled if there is sufficient demand for them.

Some of the meetings are elective, and supervisors may take the ones they feel they may need. The bulk of the conferences, however, are for the general discussion by all of subjects of common interest. A quarterly 5-day meeting for new supervisors covers fundamentals.

BOOKLET PRESENTS PLANS, POLICIES TO EMPLOYEES

Reprints of advertisements appearing in 1945 have been presented in a booklet, "Reporting to Our Neighbors," to acquaint employees of the American Viscose Corporation and the members of their communities with the plans and policies of the company.

These advertisements covered the importance of teamwork in production, the company's expenditures and earnings, its reemployment policy, victory messages, and a new series illustrating the economic principles behind the idea of "producing more in order to have more."

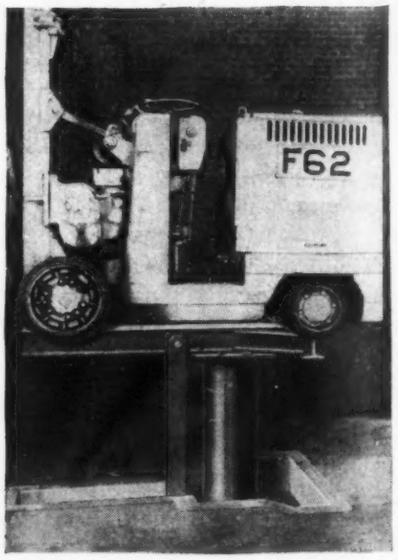
KEEPING DRILLS AND TAPS TOGETHER SAVES TIME

G. H. BILLINGHAM, Designer - Engineer, The Burrows Corporation, Portland, Me.

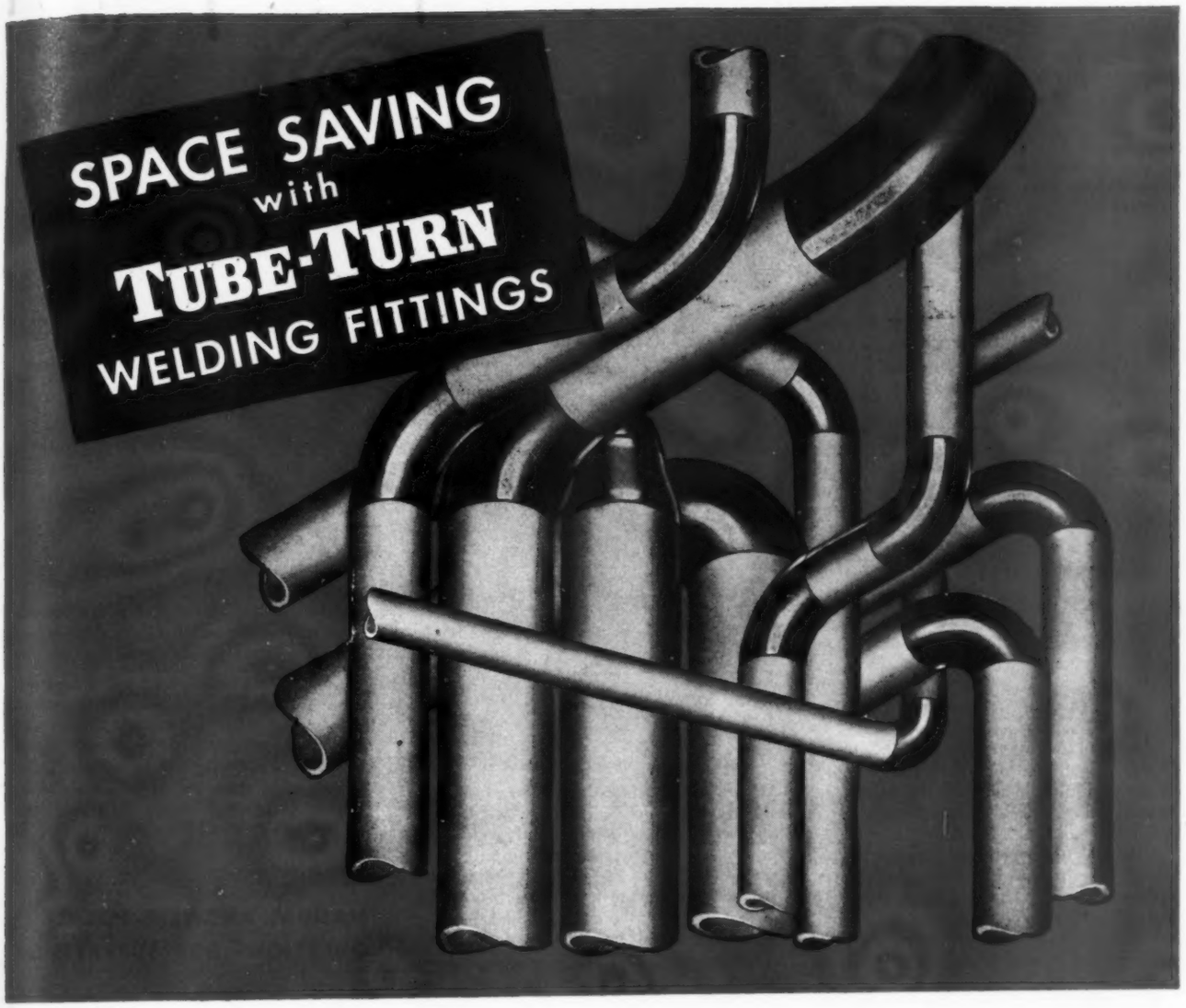
A simple method of providing the drills of the proper size to be used with a set of taps has been found to save time and trouble.

Workmen often were seen hunting through their toolboxes for the right drill, or getting a new one from the toolkeeper, without checking the sources of used drills. The drills selected were sometimes ground incorrectly, or for a special purpose. A drill gage was not always handy.

To correct these difficulties enough of the cover of some small screw plate sets was routed out to admit the drills to be used with the taps. Then holes of the proper size were drilled through the end of the cover to act as a holder. Part of the end of the cover was then grooved out for a strip of wood to cover the holes and serve as a stop, and also kept the cover in shape and cut down breakage. The number of each drill, and the tap to use with it, was shown



By means of adjustable axle blocks, two under the front axle and one under the rear, power truck is held in position at the Massena plant of the Aluminum Company of America on a hydraulic service elevator. When raised to servicing position, the wheels turn freely. Platform consists of one longitudinal H-beam and one transverse H-beam, which are flush with floor when elevator is lowered into sump pit. Steel safety guard drops to vertical position on bottom of pit when elevator is raised



COMPACTNESS and flexibility are built into piping installations where pipe is joined with Tube-Turn welding fittings. Ceiling mounted pipe and streamlined expansion loops, for example, are constructed with only plain butt welds in nearly all cases. Tube-Turn elbows and returns can be cut to odd angle turns because of their uniform wall thickness.

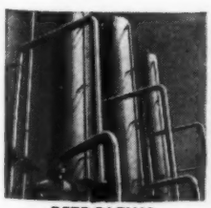
Close-nested, permanently leakproof piping systems are further assured by the dimensional accuracy of Tube-Turn welding fittings. This accuracy permits installing *any* pipe line according to design without making allowances for variations in individual fittings. All Tube-Turn fittings of the same part number are identical in all dimensions. Whatever your fittings requirement, from one-half inch to 30 inches, choose quality-controlled Tube-Turn welding fittings for uniform wall thickness, smooth inner wall, close-knit grain structure, freedom from inherent strains.

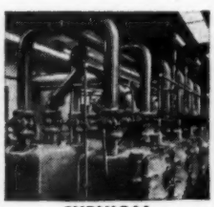
Consult your favorite piping authority and see your Tube Turns distributor. For more information on superior Tube-Turn welding fittings and pace-setting installations in many industries, write for Catalog 111.

Selected Tube Turns Distributors in every principal city are ready to serve you from their complete stocks.

TUBE TURNS (Inc.) Louisville 1, Kentucky. Branch Offices: New York, Washington, D. C., Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, Houston, San Francisco, Seattle, Los Angeles.

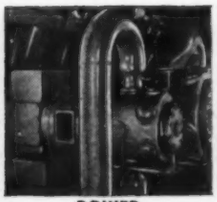
TUBE-TURN tt *Welding Fittings and Flanges*


PETROLEUM


CHEMICAL

GENERAL PIPING

SHIPBUILDING


POWER

EQUIPMENT

A swinging arm holding fixture which supports the shear is simplifying the cutting out of complicated designs from sheet metal stock with a portable power hand shear, at the Fitchburg plant of General Electric Company. Fixture makes it much easier for the workman to operate the shear, and gives him better control of the work when cutting complicated designs

on a piece of heavy paper glued to the bottom of the routed section.

When training new men this unit saves plenty of instruction time and broken taps, and helps to keep up interest because work is not spoiled by the utilization of improper sizes of drills. When these outfits are given out the men are told to return them in as good condition as they were received. Broken drills or taps are easily spotted and are replaced promptly.

DRILL PRESS USED TO SAW WOOD TRUCK FLOOR

A bench drill press with a cup saw mounted in the chuck is used in the Sunbury plant of Westinghouse Electric Corporation, to drill holes in the floor of a truck in which radio equipment is mounted.

The head of the drill press is turned around away from the table and lowered on the column so that when the spindle is lowered there is enough travel of the saw to cut through the truck floor.

Although this machine was not intended to be used as a portable drill, it has proved satisfactory in this application. It is not too heavy to be moved about, but heavy enough to stay in position during drilling, and it can be depended upon to produce a neat hole.

This type of drill press can be used for drilling holes in large crates or large boards when a deep-throated drill press is not available, or when the work is too large to be taken to a drill press.

GUTTERS CATCH MONITOR DRIPPAGE

J. A. **HARTWICK**, Plant Engineer, Kellogg Switchboard & Supply Company, Chicago

During the wintertime, the condensation forming on the inside of windows in the overhead monitors frequently caused discomfort and annoyance by dripping down on the employees. It was also necessary to make sure that stock was not left underneath the windows, as it would be spoiled by being wet.

Ordinarily, any interior condensation of this kind would drain to the outside roof through holes in the sash frames, designed for that purpose. In cold weather, however, these drainage holes froze shut. The drippage problem then became a nuisance.

To eliminate this trouble, about 4000 feet of 4-in. standard-length galvanized gutter was nailed to the wooden framework about 2 feet below the window sill, set back several inches from the vertical line of drippage. Each length of gutter was closed at both ends, since the condensation in the gutters evaporated before it accumulated to the point of overflow.

SENIORITY

83. Q. Does seniority apply to Union members only or to non-members as well?

A. It applies to all employees in the bargaining unit, whether they are members of the Union or not.

* * *

84. Q. Are there ever two seniority areas in one department?

A. Yes. For example, in wool sorting the sorters would be in one seniority area, and the truckers in another because operators in those two jobs are not interchangeable.

* * *

85. Q. If a former employee is re-employed, does his previous service count toward his seniority?

A. If he is rehired after August 14, 1944, his previous service does not count toward his seniority.

MANUAL ANSWERS POLICY QUESTIONS FOR SUPERVISION

To give supervisors the answers to every question they can ask on labor relations, the Forstmann Woolen Co., Passaic, N. J., is issuing a 30-page manual giving specific answers, approved by the union, to 139 questions. These questions-and-answers, examples of which are shown at the left, comprise the official labor relations manual of the company.

Designed to cover every point in administration of labor relations under the union contract, the booklet is loose-leaf so that sheets may be reprinted as changes are made. Questions were "wrung out" of supervisors in conferences with small groups. Answers were prepared by Forstmann management, then submitted to union officials to avoid generating disputes after publication. Only 12 points were questioned by the union and those differences were easily ironed out.

Covered in the 139 questions is the entire range of problems a foreman might meet, from a definition of "family" for credit for funeral absence, to his own seniority status.

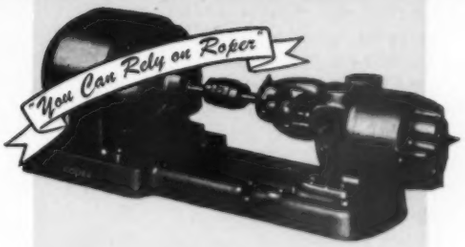
To prevent any misunderstanding the booklet's introduction states that answers are official policy of the company unless expressly amended or modified. It assures supervisors they will be advised of any changes and charges them with responsibility for carrying out the policies outlined.

Your test-ticket

PUMP PROVING GROUND WORKS FOR YOU AT ROPER

Here on a dynamometer test block, a Roper 75 g.p.m. pump is put through its paces. With modern test facilities its performance is accurately measured, and results are predetermined. It is a painstaking procedure that is followed out at Roper to prove each pump.

Yes, prior to shipment, each Roper is given a rigid, individual horsepower and capacity test. And the test standards set up to meet requirements are recorded on the "test-ticket" which you receive with each pump. It's your insurance against faulty performance and costly time losses. For standard as well as for special engineered units, the proving ground works for you at Roper.



Proved Roper Features that Insure Dependable Service

Continuous bearing lubrication .. Axial hydraulic balance . . . Floating equal size external gears . . . Oversize bearings, gears supported at both ends . . . Efficient operation in either direction . . . Can be serviced without disturbing pipe connections, power unit or pump mounting . . . Packed box or mechanical seal units to suit requirements.

SEND FOR CATALOG TODAY

Illustrating and describing pumps built to handle pressures up to 1000 lbs. p.s.i., capacities ¼ to 300 g.p.m. at speeds up to 1800 r.p.m. Lists service and engineering offices in principal cities.

GEO. D. ROPER CORPORATION
185 BLACKHAWK PARK AVE., ROCKFORD, ILLINOIS

ROPER
Rotary Pumps

PUMPS ESPECIALLY ENGINEERED TO FIT YOUR REQUIREMENTS

MOTOR UNITS

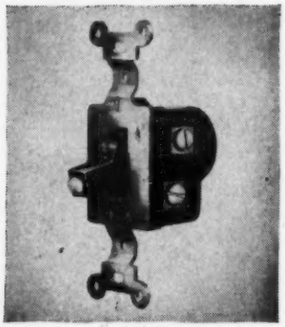
FOOT MOUNTED

FLANGE MOUNTED

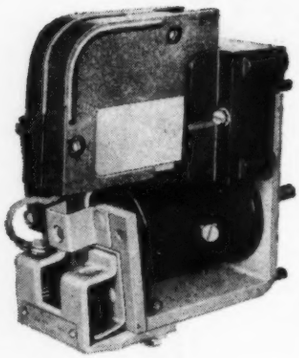
BUILDERS OF PUMPS FOR MANUFACTURING, MARINE, PETROLEUM, AND PROCESS INDUSTRIES

motors, controls, switches

Motors, controls, and switches introduced to you by FACTORY during the past 12 months are reviewed here to give you a quick one-year summary

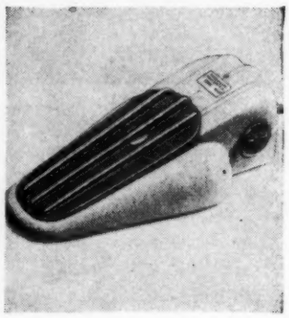


DELAY TIMER—All-purpose lighting or power switch, called Tymzit, features toggle-lever arrangement for both delayed-action and instantaneous off. Can be set at any interval from 0 to 3 minutes. Unit fits standard wall box, and is made in single- and double-pole assemblies, rated at 10 amperes at 125 volts, and 5 amperes at 250 volts. T. J. Mudon Company, Chicago.



MAGNETIC CONTACTOR—For machine tool control, mine, and similar severe duty where space is limited, Type M single-pole magnetic d.c. contactor is made in rear- or front-connected units. Small frame contactors are limited to applications up to 250 volts, while the deep frame units are suitable for up to 500 volts. Westinghouse-Electric Corporation, Pittsburgh.

FOOT SWITCH—Any motor-driven equipment up to 1 horsepower may be controlled with foot switch, called Time-O-Lite. Features neon pilot light on foot pedal inside switch, and non-skid base. Designed for a.c. circuit, it incorporates a heavy-duty snap-action, single-pole, double-throw switch, silver contacts. Each outlet has 1500-watt capacity. Industrial Timer Corporation, Newark, N. J.

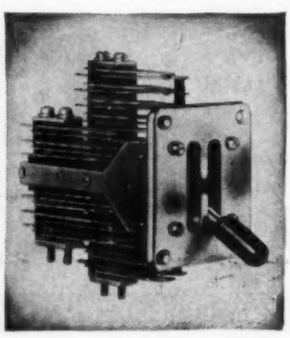


MOTOR—vertical type, is rated at 40-deg. C. rise continuous duty with 15 percent service factor. Operates from 60- or 50-cycle, 3- or 2-phase a.c. circuits at standard voltages. Has flange- or face-type mountings. Ventilating openings are shielded from dripping liquids and falling particles. Crocker-Wheeler Division, Joshua Hendy Iron Works, Ampere, N. J.

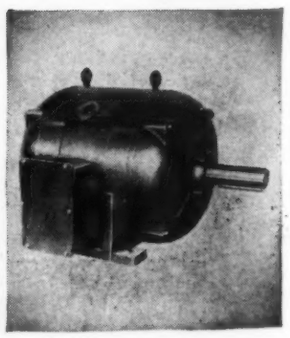
FOOT SWITCH—Known as Model MK, is adapted for light machining and similar operations. Welded steel housing safeguards toe treadle from accidental actuation. Switch is made in one type with a single-pole, normally open, Arco switch element. Holes are provided in flanged base for mounting to floor. General Control Company, Boston.

MOTOR CONTROL — provides single-knob precision control of direction and extent of motion for any type of reversible motor. Pulsing control drive permits a motor to be run continuously, or turned in small increments. Designed to suit every purpose, permitting quick approach and precise positioning of controlled object. Yardeny Engineering Company, New York.

LEVER SWITCH — Series 4500 heavy-duty lever switch is available in either four-position (Series 4504), or five-position (Series 4505) assembly. Can be used for safety selective switching as well as for emergency transfer of spare equipment. Donald P. Mossman, Inc., Chicago.



MOTORS—Models B58-A, B, and C are a.c. squirrel-cage protected-type motors, available from 1 to 200 horsepower. Rated 40-deg. C. rise, full-load continuous duty, with a 15 percent service factor. Have two shielded air exhaust openings in upper half of frame. Centrifugal bearing seal is incorporated in ball-bearing types. Crocker-Wheeler Division, Joshua Hendy Iron Works, Ampere, N. J.



CONTINUED ON PAGE 160

How to Count Up to 4000 R.P.M. on 5 Fingers!

Read Machine Speeds in Seconds with the Handy Little Stewart-Warner Portable Hand Tachometer #757-W

IT'S *small* but it's rugged. In a matter of seconds you can get a reading on machine speeds, whether shafts or pulleys revolve clockwise or counter-clockwise.

This inexpensive, precision-built instrument is ideal for production engineers, maintenance superintendents, foremen, shop mechanics and service men.

The Stewart-Warner Portable Hand Tachometer enables you to be sure your machines are operating at maximum efficiency—a mighty important fact to know in the coming period of tough competition.

The complete unit comes ready to use . . . ready to check machine speeds from 100 to 4000 R.P.M.

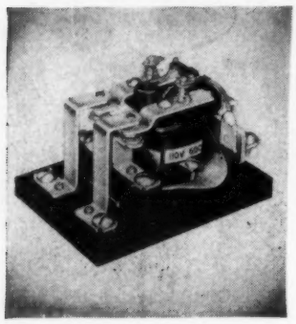
Why not get several Stewart-Warner Hand Tachometers for your plant? Write for additional details today. No obligation.

Stewart-Warner Portable Hand Tachometers come ready to use, packed in a carton that can be retained and used as a case for the instrument. Included are two tips—(No. 1) for shafts having a center hole—(No. 2) for measuring speed of flat shafts, pulleys, etc. Price only $9.50 each.

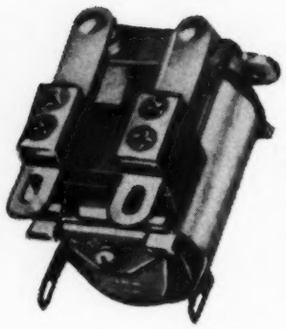
STEWART-WARNER
Industrial Tachometers

Stewart-Warner Corporation
1870 Diversey Parkway, Chicago 14, Illinois

Another Product of
STEWART WARNER

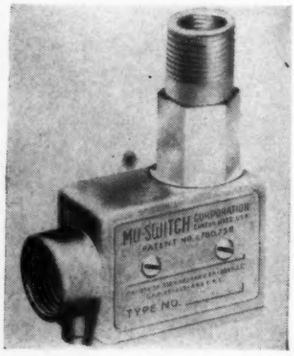


POWER RELAY — Double-pole, double-throw Type PR-8 power relay is designed for such power circuits as motor starting and heater loads up to 15 amperes. Coil operates on 4 volt-amperes (approximately 3 watts). Standard coil voltages: 6-, 12-, 24-, 110-, 220-volts with 50-60 cycles; 6-, 12-, 24-, 110-volts with direct current. Potter & Brumfield Sales Company, Chicago.

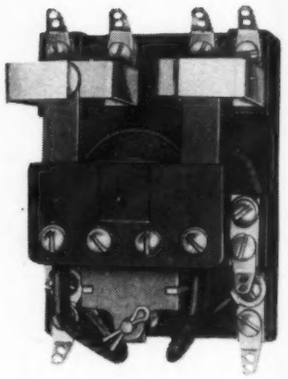


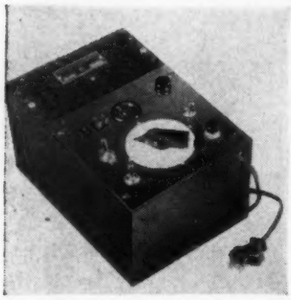
RELAY—Type CR, is suitable for lightweight control applications where precise operation is required in industrial and special control circuits. Made in two-, three-, and four-pole combinations, and hermetically sealed, if desired. Rating with ¼-in. silver contacts is 15 amperes at 24 volts d.c., or 110 volts a.c., non-inductive. Allied Control Company, New York.

PRESSURE SWITCH — for controlling circuits actuated by pressure changes of a liquid or gas; operates with a differential of 5 to 15 pounds at nominal ratings of from 10 to 120 p.s.i. Type M switch is rated at 15 amperes, 125 volts a.c., to 2 amperes, 600 volts a.c., and standard Type A has a maximum current rating of 25 amperes at 28 volts d.c. Mu-Switch Corporation, Inc., Canton, Mass.

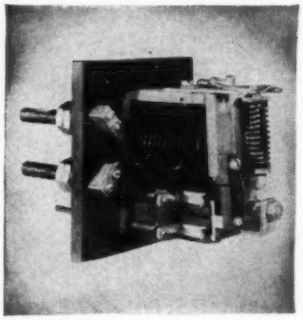


RELAY—For use in relaying output of electronic apparatus, instruments such as pyrometers, and for general control functions, Type WT relay is for both a.c. and d.c. service. Double-pole design with poles electrically insulated on moving arm. Main contacts are rated at 10 amperes, 300 volts, and may be used on circuits up to 600 volts. The Electric Controller & Manufacturing Company, Cleveland.



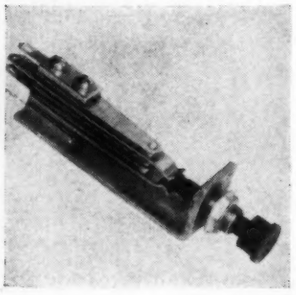


PROCESS TIMER —electronically closes or opens an electrical circuit for an adjustable time interval from 0.05 second up. Designed for single actuation as well as for sequence timing and recycling in continuous operation. Timing period is adjusted by a continuous (stepless) control on panel. Photovolt Corporation, New York.

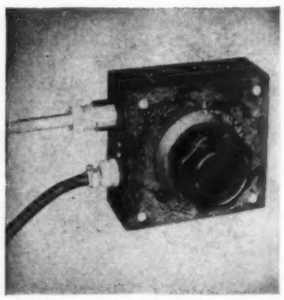


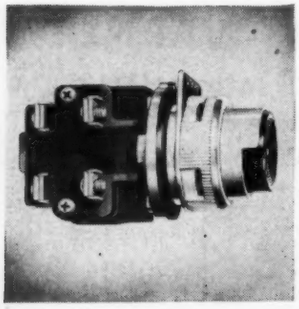
RELAY—for d.c. operation, is claimed to provide almost instantaneous magnetic overload protection. The single-break, normally closed main contacts and the double-break auxiliary contacts are suitable for carrying 5 amperes continuously, and for interrupting a d.c inductive coil load of 150-va. maximum. Westinghouse Electric Corporation, Pittsburgh.

PUSH SWITCHES — Series 5300 standard-duty, and 5300X extra-heavy-duty push and plug jack switches are for circuits carrying heavy currents. Adaptable to test panels, instruments, meter circuits and similar applications. Standard switch is available in 5 amperes, 115 volts a.c. (non-inductive); extra-heavy-duty in 10 amperes. Donald P. Mossman, Chicago.

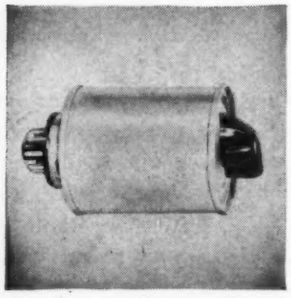


REMOTE CONTROL—When applied to commercial speed changers, Flectrol is said to provide finger-tip remote control of speed with an accuracy of 2 percent. Unit can be built in or added to motor-operated valves, machine tools, conveyors, and other equipment having motor-operated adjustment. Yardeny Laboratories, Inc., New York.





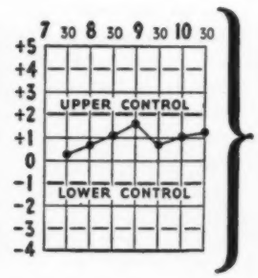
PUSHBUTTONS — designated Class 9001 Type T, are for group mounting on machinery or control enclosures. Claimed to be oil-tight, pushbuttons can be quickly installed, and mounted on close centers. Controller Division, Square D Company, Milwaukee.



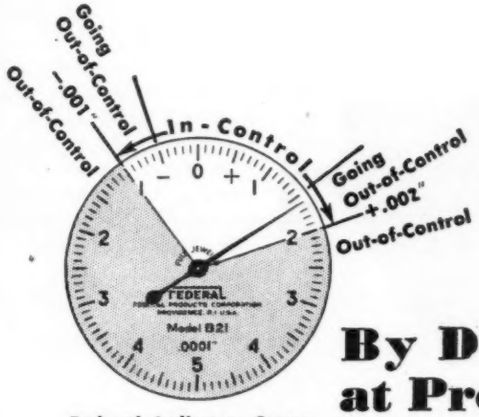
SELF-TIMING INTERRUPTER—consists of a glass-enclosed thermal element of the hot-wire type, a small power relay, and a resistor, to apportion the flow of current between thermal element and relay coil. Timing ranges from 1 to 12 pulses per second; voltages to 32 volts d.c., 125 volts, 60-cycle a.c. Electronics Controls, Inc., Newark, N. J.

CONTINUED ON PAGE 162

DIMENSIONAL QUALITY CONTROL



+ { FEDERAL Dial Indicator Gages



Federal Indicator Gages analyze the drift away from the dimensions specified.

= { Less Scrap Better Work

By Dial Indicator Readings at Production, *You Are Able to Determine WHEN Dimensions are Going "Out-of-Control"*

FEDERAL Dial Indicator Gages *visualize* the progressive change, *during production,* in the dimension of the workpiece toward the Out-of-Control danger Zones. Thus you are forewarned when machine adjustments are about to become necessary.

Federal Dial Indicator Gages also enable you to obtain *accurate* Observation Readings for obtaining the Averages, Ranges, and other data necessary for making up the Control Charts. They eliminate guess work and enable you to obtain these readings more quickly with less chance of inaccuracies due to human variations in reading micrometers or other gaging instruments.

A Federal Gage, equipped with a Federal Dial Indicator, is a "natural" for Quality Control Engineers and their inspectors. Unlike the unreadable, conventional type gage, which shows only the go and no-go condition, it is possible with the Federal Indicator Gages to analyze the variation or drift away from dimensional requirements. In Quality Control parlance you obtain control, with Federal Indicator Gages, by Variables as well as by Attributes. Other type gages show *only* Attributes.

We have assisted hundreds ot concerns in designing gages for controlling every type of dimension. Write our engineering department regarding your requirements. There is no obligation.

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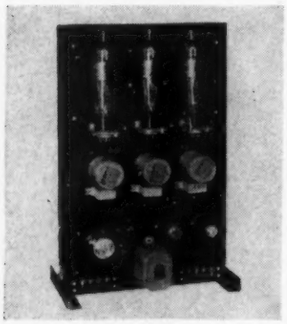
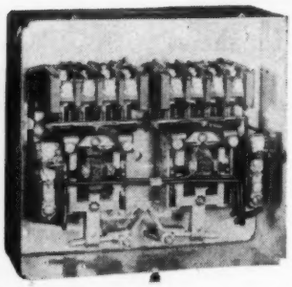
PRECISION MEASURING INSTRUMENTS



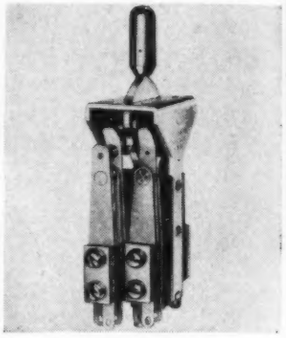
SPEED CONTROL — named Servotron, functions electronically. The variable speed drive operates on a.c., and through electronic controller it runs a d.c. variable speed motor, maintaining uniform torque. Eliminating changing of gears, the drive has instantaneous dynamic braking and reversal without speed overrun. Submarine Signal Company, Boston.

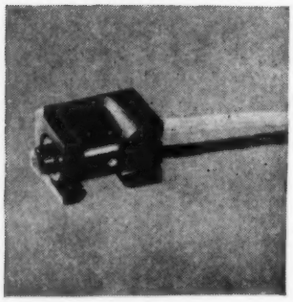
SWITCHES—for either vaccuum or pressure up to 200 pounds, are for controlling liquids or gases which do not corrode brass. Rated at 10 amperes on 110-volt a.c. Type M-500 has an externally adjustable range with fixed differential; M-600 can be reset manually; and M-700 has an adjustable differential. The Aerotec Company, White Plains, N. Y.

STARTER — Featuring semi-interference-type mechanical interlock, a.c. magnetic reversing starter is made in sizes 0 and 1. Developed for full-voltage starting of squirrel-cage induction motors. Provides undervoltage protection; undervoltage release; and tamperproof overload relays. Industrial Control Division, General Electric Company, Schenectady.



SWITCHES—Series 4101 is a heavy-duty lever switch for motor starting, stopping, reversing, and motor plugging. Series of combinations of available contact assemblies may be built up to suit requirements. Series 4101-KP, for extra-heavy-duty, is enclosed in housing having cable socket. Contacts are rated at 10, 20 amperes, 110 volts a.c. (non-conductive). Donald P. Mossman, Inc., Chicago.

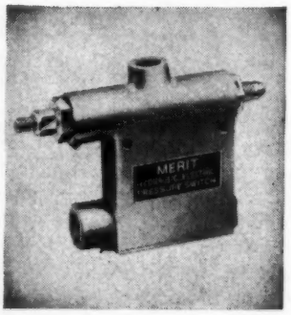




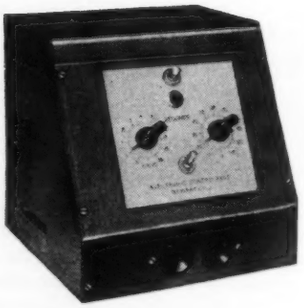
SWITCH—renewable type, can be used in a single-hole mounting, and has two flat studs to which lugs can be attached. Single - pole single - throw switches, either normally open or normally closed, are rated at 15 amperes, 110 volt a.c., for either motors or resistive loads, such as heaters or lamps. Robert Hetherington & Son, Inc., Sharon Hill, Pa.

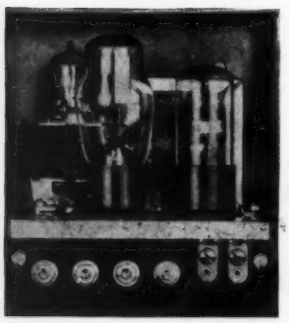
TIMER—electronically actuated, provides interval control from 1/25 to 80 seconds. Employing two vacuum tubes, it is controlled by a pushbutton. No resetting is required between operational cycles. Caltron Company, Los Angeles.

SWITCH—hydraulically operated and featuring chatterless valve, covers operating range of 100 to 3200 p.s.i. by two interchangeable cartridges having different springs. Differential of 15 to 18 percent actuates the single-pole, single-throw, normally closed switch. Merit Engineering, Inc., Providence, R. I.

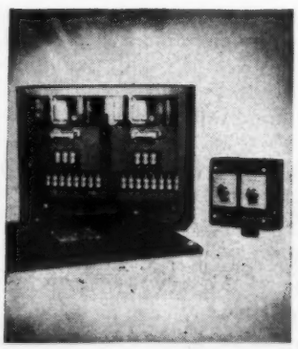


TIMER—Designed for applications requiring accurate circuit timing, electronic timer has range from 1 to 120 seconds in increments of 1 second. Contacts are normally wired single-pole, double-throw with double break, and are rated at 25 amperes, 32 volts d.c., 25 amperes, 125 volts a.c., and 10 amperes, 230 volts a.c. Electronic Controls, Inc., Newark, N. J.





SWITCH—Incorporating a relay with hermetically sealed contacts, Model 8336 electronic switch can be used where flammable gases are present. Embodying all other features of the manufacturer's 30-amp. switch, it is suitable for pressureless limit switching and floatless control of liquid levels. United Cinephone Corporation, Torrington, Conn.



TIMER—Type 2T15U electronic repeat-cycle timer is for machinery and process control in applications requiring two adjustable timing periods to run in a continuous cycle. Cycle is initiated by either momentary or sustained contacts, and recycling is automatic. Timer is universal for six maximum time ranges from 1.5 seconds to 2 minutes for each period. Photoswitch, Inc., Cambridge, Mass.

Completely uniform temper is the characteristic of these Homo-tempered cold-heading dies, in the plant of Shakeproof Inc., Division of Illinois Tool Works, Chicago and Elgin, Illinois. A typical product headed by such dies is the "Sems" pre-assembled screw and washer shown at right.

A die on the way from Vapocarb-Hump Furnace to quench. Its surface is as smooth as when it left the tool-maker, and its heat-treated structure is as accurate as are its physical dimensions.

HEAT-TREATING TOOLS?

It's More Accurate by Vapocarb-Hump Hardening & Homo Tempering Methods

Heat-treatment of bolt-heading dies and other tools is a production job in the Screw Products Departments of Shakeproof Inc. As a result, emphasis is placed on the uniform quality and smooth operation which mass-production makes possible.

In holding these advantages, much credit is given to the Vapocarb-Hump Hardening and Homo Tempering Methods. Used as a team, the Methods let the heat-treater shape a tool's structure just as accurately as a machinist shapes its dimensions. Surfaces of tools are as smooth after heat-treatment as before. Hardness and temper are so exactly controllable that the combination needed for longest life is easily discovered and then automatically duplicated. Tools give long-lived, uniform production.

If you wish further information about Vapocarb-Hump and Homo Methods, an L&N engineer will either call or send Catalogs, as you prefer.

Quick-Reading TEMPERATURE-CONVERTING TABLES (Dr. Sauveur's Type)

For speed, when you're converting degrees F to C, and vice versa, you can now use a simple, compact "Sauveur-type" table all the way from absolute zero to 1750 C and 3182 F. in increments of one degree.

For quantities, there's a slight charge: ten copies for 75¢; 50 for $3.25; 100 for $6.00. To minimize bookkeeping, we must ask that orders be accompanied by check for the exact amount, addressed to our Advertising Dept. . . . but please note that a single copy will be sent free on request. Better get one!

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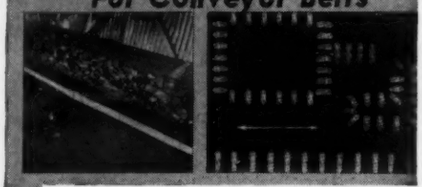
MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

Jrl Ad T-620 (21)

Present Day Practice in Belt Fastening

Every man who has anything to do with the purchase, application or maintenance of conveyor, transmission or V-belts will find the bulletins listed below of considerable value in connection with belt fastening work. A knowledge of present day practice in belt fastening helps reduce the loss in machine hours due to belt failures caused by the use of the wrong type of fastener or improper application. We shall be glad to send any or all of them to you or to any of the men in your organization.

For Conveyor Belts



FLEXCO HD Belt Fasteners are used to make a "water-tight" butt joint in conveyor belts ranging from ¼" to 1½" thick and of any width. The view on the right shows the various types of rips and patches that can be made with these fasteners and Flexco HD Rip Plates.

Bulletin F-100 gives complete details on how to fasten and repair conveyor belts.

For V-Belts

ALLIGATOR V-Belt Fasteners are now being widely used to fasten B, C and D, open-end V-belting of cross woven fabric core construction now being made by most belting manufacturers. The view at the left shows a typical application of these fasteners to a drive where endless V-belts would require dismantling the machinery to put the belts on the sheaves.

Bulletin V-205 gives complete instructions on how to use V-belt fasteners.

FLEX V Fasteners for A and B belts are also available for lighter duty V-belt drives. Ask for **Bulletin V-14.**

For Transmission Belts

ALLIGATOR Steel Belt Lacing is in world-wide use to make smooth, flexible joints in leather, rubber, balata, stitched canvas or solid woven belts up to ⅜" thick and as wide as they come.

Bulletin A-60 tells how to fasten and repair transmission belts.

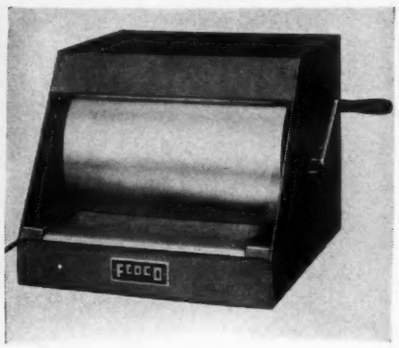
Sold by Supply Houses Everywhere

FLEXIBLE STEEL LACING COMPANY
4678 Lexington Street, Chicago 44, Ill.

what's new in equipment

PRINT DRYER

Dryer for photostats, copy prints, and blueprints is manufactured in two models, for either hand or motor drive. Motor-driven unit is said to dry up to 120 9x11-in. or 90 11x14-in. photostats per hour. Dryer features a continuous single belt of preshrunk duck, held automatically to prevent sideslip. It occupies bench space 18 inches square and 15 inches high. The drum is heated by a 300-watt electrical



element which is controlled to prevent scorching. Element is mounted on the inside surface to give even heat distribution. Dryer can be used on 115 volts, either a.c. or d.c. Fredco Products Co., 37 Murray St., New York 7.

TRANSMISSION

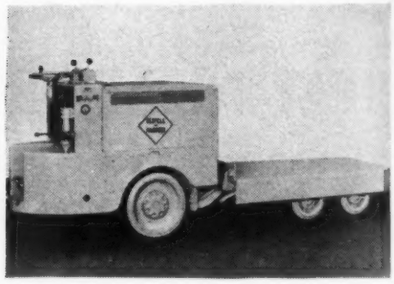
Known as 9000 B series, transmission is adapted to flat plate or platform mounting. Unit has 5-hp. capacity with input speed of 900 r.p.m., and four gear changes are available through one shift lever, automotive type. Standard ratios are 1:1; 2:1; 3:1; and 4:1. All gears and shafts are of alloy steel, heat-treated, and gears are lapped. Revolving shafts are mounted on antifriction bearings, and case is oil sealed. Western Mfg. Co., 3400 Scotten Ave., Detroit 10.

WELDING LENS

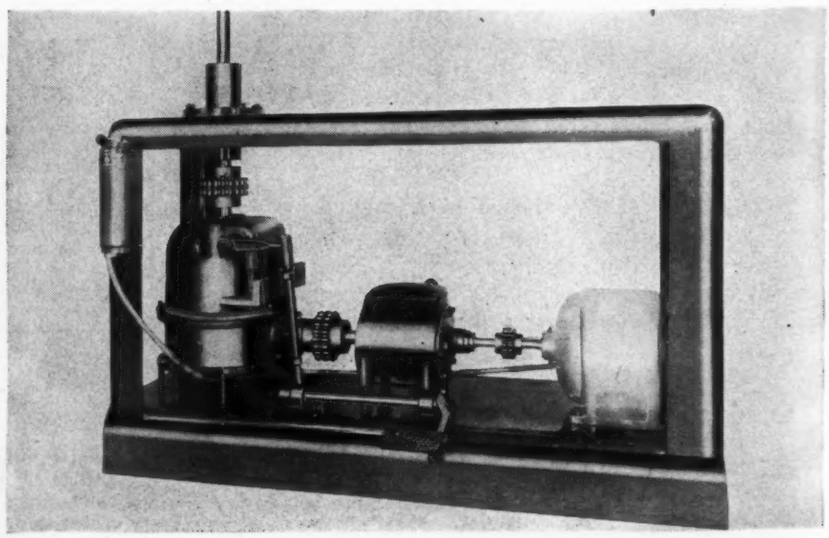
Baked plastic cover lens has coating from which smudge and smoke can be wiped with a damp cloth without affecting coating. Coating is claimed also to minimize the effects of weld spatter because the accumulation can be removed. Lens is available as plates for helmets and handshields and in 50-mm. size for goggles. Eastern Equipment Co., Inc., Willow Grove, Pa.

INDUSTRIAL TRUCK

Low-bodied, 10-ton industrial truck, driven by storage batteries and electric motor, is said to give operator complete view of



platform, load, and surroundings. Over-all length is 147 inches, width 45 inches. Four wheels are under platform for load stability, and six-wheel steering permits turns in aisles 71 inches wide. According



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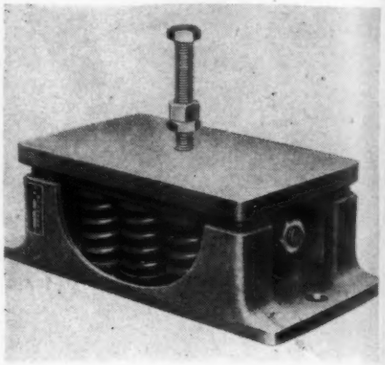
to the manufacturer, speed may be accelerated rapidly to 6 miles an hour, while the truck can come to a dead stop within a few feet. Electric drive and controls provide flexibility. Elwell-Parker Electric Co., Cleveland.

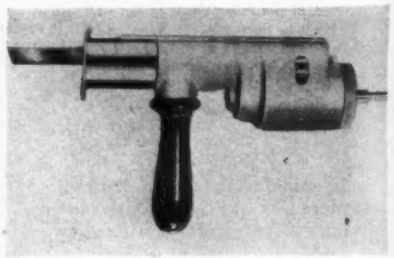
VIBRATION ISOLATOR

Steel spring vibration isolating unit, known as Type LK Vibro-Isolator, is designed in 26 sizes for rated loads from 75 to 12,000 pounds. Adjustable chocks in the four corners of the housing act as stabilizers. Unit is said to provide efficient vibration control for impact machinery, generators, panelboards, material testing and processing equipment, ventilating and air conditioning equipment, recording apparatus, business machines, and other industrial equipment. Korfund Co., Inc., 48-15 Thirty-Second Place, Long Island City 1, N. Y.



SAW

Hi-Speed saw, which can be attached to any ¼-in. electric drill, air drill, or flexible shaft, saws and files metals, wood, and plastics. It chucks in drill chuck or collet; uses ordinary hacksaw blades and standard ¼-in. shank machine files. Design and construction are said to permit use in cramped quarters. True sawing is obtained by square plunger action with take-up for wear. All rotating parts are ball-bearing, running in oil. Wyzenbeek & Staff, 838 West Hubbard St., Chicago 22.



CONTROL VALVES

Three types of valves, for air and hydraulic controls, simple in construction, are said to require minimum operating effort. One type is a packless ¼-in. valve for tubing and light piping applications. Designed for

On many applications of material handling, processing and conveying equipment; mixers and agitators; welding positioners; machine tool drives; testing and calibrating equipment . . . to name only a few . . . variable speed operation makes a tremendous improvement in the quality of the product and the quantity of production as well.

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Conveying materials pneumatically is a day-by-day job of R-C blowers. They move bulk and granular substances, such as grain, cotton seed and soda ash. Gases and liquids are distributed and measured by R-C blowers, pumps and meters. They're found in such widely varying work as:

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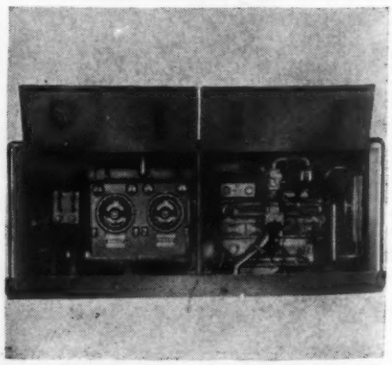
4-way operation, it may be used as a 3-way valve by plugging one port. Suitable for pressures up to 250 p.s.i. An 80-deg. handle movement gives complete reversal. Available for manifold, column, or panel mounting. Another type, a foot-operated valve, is made for cylinder applications. Packless, it is made in two styles: (1) With single pedal for constant cycles of operation; and (2) with split pedal which holds position until tripped for reversal. Available in $\frac{3}{8}$-, $\frac{1}{2}$-, $\frac{3}{4}$-, and 1-in. sizes, it operates on 250 p.s.i. air pressure or 1000 p.s.i. oil pressure. Third type, a two-directional speed control valve, is designed for control of cylinder piston speed in both directions. It provides for adjustable control of inflow and outflow of air or oil to and from one side of the piston. Working pressures are 250 p.s.i. for air cylinders and 1000 p.s.i. for hydraulic. Pipe sizes available are $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch. Hanna Engineering Works, 1765 Elston Ave., Chicago 22.

LOCKWASHERS

Line of spring lockwashers made to comply with standards of the American Standards Association and to meet both ASA and SAE specifications is announced. Washers are packaged distinctly to enable user to distinguish them from the former SAE standard product. Reliance Div., Eaton Mfg. Co., Massillon, Ohio.

GAS-DRIVEN WELDER

Gasoline-engine-driven arc welder, for two operators, is made by placing two 300-amp. generators on a common shaft, supplying them with separate excitation from a common exciter. The double unit is directly connected to an 8-cyl. Chrysler industrial



J&L Wire Rope is made with precision by skilled men with the same patient attention to detail, the same insistence upon quality material, as the best hand-made match piece.

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GILMORE WIRE ROPE DIVISION

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J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE

Eliminate overweight and underweight in your weighing operations. Convert one beam scale—or a battery of them—in a few minutes—to accurate, time saving, money saving, weighing equipment. End time losses waiting for a beam to come to rest at *about* correct weight. This head magnifies the balance 9½ times—shows up the tiniest fraction of weight discrepancy. The indicator stops instantly at correct weight.

Try *one* Detecto-Gram Head. Let a Detecto Scale engineer show you *how* much it does to speed work, save money and manpower and end "just-about-right" weighing.

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DETECTO · SCALES · INC.

MAKERS OF FINE SCALES SINCE 1900

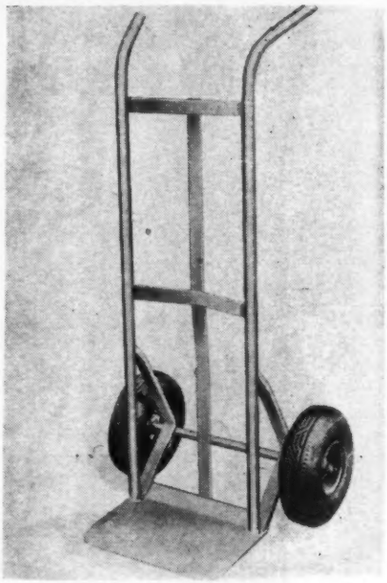
ONE MAIN STREET • BROOKLYN 1, N. Y.

SCALE ENGINEERS IN ALL PRINCIPAL CITIES

engine. Operators can work independently of each other, since engine is governed to maintain constant speed for all loads. Paralleling switch is provided to turn the unit into a single-operator, 600-amp. unit for heavy welding and cutting duty. Manufacturer states that connecting two units to one engine gives a high over-all economy by reducing net idle running time of the engine. The Hobart Bros. Co., Troy, Ohio.

HAND TRUCK

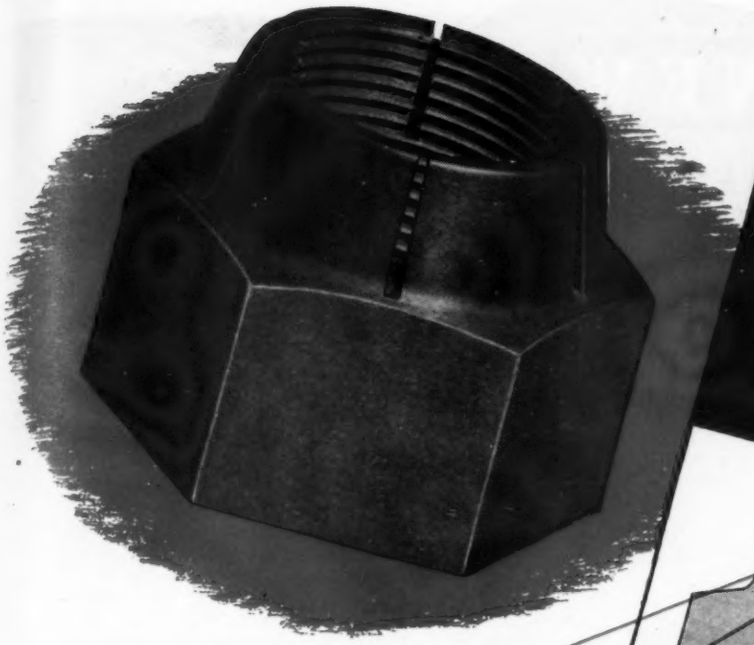
Featuring a solid nose that is said to facilitate handling cases, bags, and kegs, hand truck has been added to the Wheel-Ezy line. A "General" pneumatic wheel has been adapted for use on the one-piece arc-welded frame. Manufacturer claims that construction permits heavy loads to



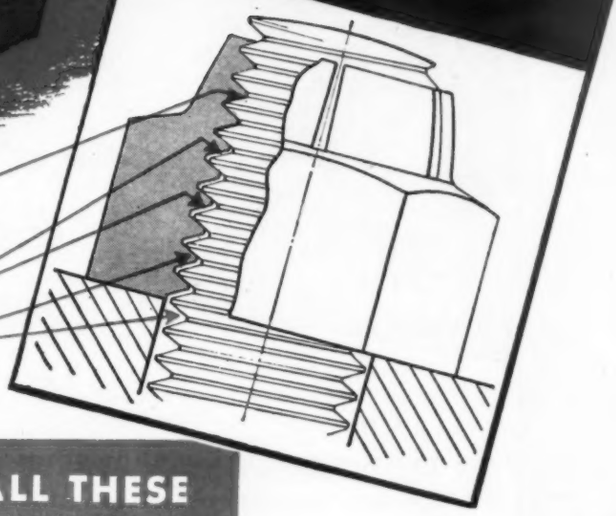
be moved up and down steps and curbs safely and easily. All parts, including bolts, are plated to resist corrosion and rust. Truck has 46-in. over-all height, 20-in. width, and a capacity of 500 pounds. Nose plate is 7½ inches long. The Rapids-Standard Co., Inc., 108 Peoples National Bank Bldg., Grand Rapids 2, Mich.

TEMPERATURE RECORDERS

Tempscribe recorders, for room and atmosphere temperature, and electrical operation, are designed for use as portable field service instruments. Feature simplified chart replacement, because pen, bimetallic temperature element or the temperature recorders, and actuating mechanism of operation recorders are in door. When door is opened pen swings out of the way, permitting unobstructed view of record. Location of temperature element is said to give maximum sensitivity to rapid changes. The 4-in. charts are self-centering. Recorder can be converted to any temperature range, or used as an operation recorder, by changing door of instrument. Clock movement is in body of instrument. Compact and self-contained, unit includes a recess in back to hold extra charts and



HUGLOCK NUTS by "National"



The UPPER threads of the Huglock nut press inward against the bolt.

The remaining threads of the Huglock nut have slight clearance at their lower flanks and frictional contact on the load-carrying flanks.

The lock nut WITH ALL THESE ADVANTAGES . . .

1 *One-piece construction*—reduces assembly time and avoids possible failure to install supplemental locking medium.

2 *Self-locking action*—the Huglock Nut grips the bolt threads and maintains locking effect, whether seated or not, on the load-carrying flanks of the threads.

3 *Axial thread play eliminated*—Huglock Nuts are vibration-proof and shock-proof.

4 *Thread load is distributed* over all the threads of the nut, instead of being concentrated on the few bottom threads.

5 *Maximum thread shear strength*—full strength of the most modern 180,000 lb. tensile alloy bolt will not strip threads in nut. (Compare this with other designs.)

6 *All metal construction* permits applications involving high temperatures, oil or other types of moisture. Self-locking is maintained at high temperatures.

7 *Easily installed*—Huglocks start freely and may be tightened rapidly by standard hand or speed wrenches.

8 *Economical to use*—cotter pins, lock washers, key plates, jam nuts or other secondary locking devices are completely eliminated.

9 *Re-usable*—repeated removal and re-use on the same bolt or a similar bolt will not destroy the locking action.

10 *Controlled preset torque values* are built into Huglocks, insuring the vibration-proof results visioned in your engineering designs.

U. S. Patents 2290270, 2333290, 2337797. Other Patents Pending

National HEADS AND THREADS PRODUCTS

Other "National" Specialties Include the Following:

Phillips Recessed Screws	Drake Lock Nuts	Screwlets
Laminar Flow Screws	Place Bolts	Hi-Shear Rivets
Marsden Lock Nuts	Lok-Thred Studs	Sems
Dynamic Lock Nuts	Rosan Locking System	Clutch Head Screws

Send for samples and consult with us on *any* fastener question.

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

See the NEW MATERIAL HANDLING METHOD at work in companies like yours

If you handle material or have material handling problems, and will write us on your letterhead, we will put you on the mailing list.

This up-to-the-minute news-picture magazine shows how wide-awake management in many lines of business is utilizing palletized unit loads and fork trucks . . . to end the burden of costly manual methods and speed production.

GOOD NEWS FOR HIGHWAY SHIPPERS

Mechanized handling made available to highway shippers by the new Clark Trucloader Method.

Clark builds GAS AND ELECTRIC POWERED FORK TRUCKS AND INDUSTRIAL TRACTORS

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CLARK TRUCTRACTOR, 1041 21th St., Battle Creek, Mich.
☐ HAVE YOUR NEAREST FIELD ENGINEER CALL.
☐ SEND US COPY OF MATERIAL HANDLING NEWS.

NAME_____

COMPANY_____

CITY_____ STATE_____

ink bottle with glass dropper. The operation recorder can be hooked into the power line, or connected in parallel with the load. Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh 8.

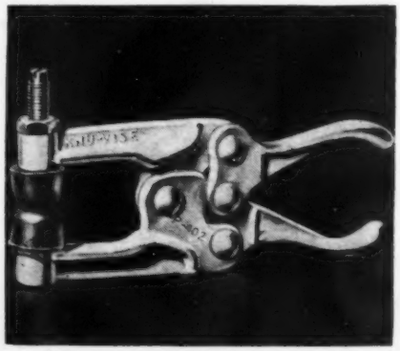
WORK GLOVE

Impregnated with oil-and-acid resistant neoprene, canvas work glove offers protection on wet, sloppy jobs. The impregnating process is said to bond the canvas and milled neoprene permanently, which results in a

rough adhesive surface that securely grips wet, slippery objects. Manufactured with both a knit and gauntlet wrist, the glove is furnished in one standard size. Pioneer Rubber Co., Willard, Ohio.

TOGGLE PLIERS

Designed to hold work for welding, drilling, riveting, and subassembly where space is limited and parts are small, toggle pliers are of cadmium-plated steel forging. Measuring 4¾ inches long and



A good place to live is a good place to work!

To look out of your office or factory window—and see green fields and wooded mountains! To step directly from work—to clean country air, health-giving sport, the kind of community you want to bring your family up in.

What man—whether executive or worker—wouldn't prefer to work in a place where he can really live, too?

Take Antrim, New Hampshire, for instance, where the Goodell Company has been producing quality cutlery for 71 years. From local and South American markets raw materials are brought to them over Boston and Maine lines—go forth as finished products for world-wide distribution.

Their strategic location near foreign and domestic markets is important. So is their access to excellent power, water and modern transportation. But *most* important is the fact that like all communities in Northern New England this town is "a good place to live", a town where a majority of the workers own their own homes, where all play a real part in the life of the community.

In today's competitive market, "weigh the scales" in *your* favor by locating your new plant in this region famous for generations for a *settled* and skilled laboring population.

For available sites, write your requirements to: E. F. Reed, Manager, Industrial Department, Boston and Maine Railroad, Boston 14, Massachusetts.

BOSTON and MAINE RAILROAD

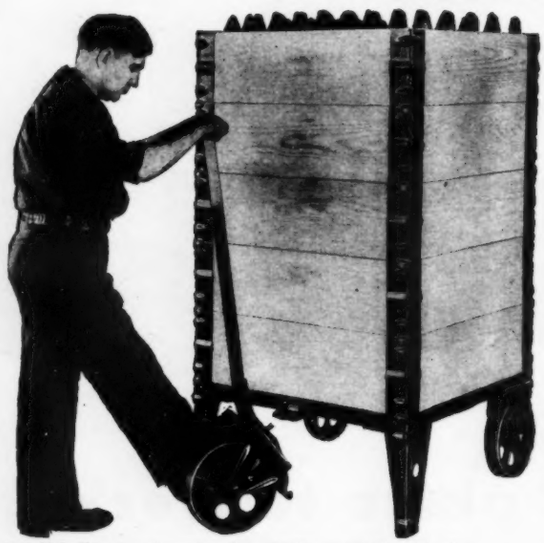
"MINUTE MAN SERVICE"

THE TURNER SYSTEM
OF MATERIALS HANDLING

Offers You 60 DAYS FREE TRIAL to Prove Its Value in Your Own Plant!

Do you think we'd make this offer if we didn't KNOW that you'd be more than satisfied?

Here's Our Proposition:

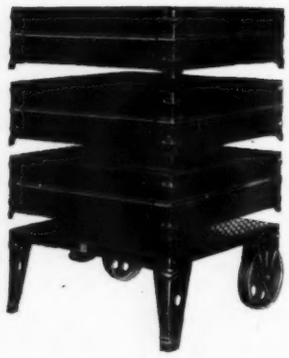


We believe there's no better way of proving the value of the TURNER SYSTEM to you than letting you prove it for yourself. Therefore, we want you to see for yourself how it works in your own plant. We are willing to ship an assortment of standard units on 60 DAYS FREE TRIAL. Send for them at once. Keep them and use them for two months. Return them if they don't do the job. The trial costs you nothing except nominal transportation charges. Write today asking us to send this assortment to you. Complete information will follow immediately.

Loaded Transports may be easily moved with the Jimmy, power lift truck, crane or tractor. Bin Sections may be added or removed as required. "DELIVER THE BIN AND SAVE THE HANDLING" is typical of Turner System savings.

These Units Can and Do Cut Costs Up to 50%

In the TURNER SYSTEM every Bin, Shelf and Box in your plant is STANDARDIZED, INTERCHANGEABLE and MOVABLE. You have flexible factory facilities which allow immediate plant rearrangement. You have equipment which cuts TIME and LABOR costs in every operation where it is used, equipment which will last indefinitely and fit into almost every handling and storing process.



Steel Bin Sections (or wooden side Bin Sections) fit on the Turner Transport.

The Transport with Wooden Deck is one of several types, all having the same sturdy, rugged construction.

Get This Free Book on the TURNER SYSTEM

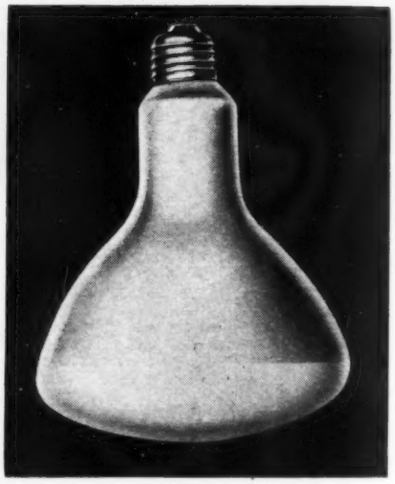
The complete system is described in a twenty-page book sent without charge to established companies. It outlines the ten Turner features and illustrates units available. Write for it on your letterhead.

FACTORY SERVICE COMPANY
4605 N. TWENTY-FIRST STREET MILWAUKEE 9, WISCONSIN

1¾ inches high (exclusive of spindle), they weigh 4 ounces. Device has a pressure ratio of 10 to 1, a pressure spindle with screwdriver slot adjustment, and handles come together to a locking stop when work is being held. Offered in four styles: P-400 with throat gap $\frac{1}{8}$x1$\frac{3}{16}$ inch; P-401 with throat gap $\frac{1}{2}$x1$\frac{3}{16}$ inch, and one rubber capped spindle; P-402 with throat gap $\frac{3}{8}$x1$\frac{3}{16}$ inch, with two rubber-capped spindles; and P-400 VG, a spring-type that can be set for loads varying from 10 to 40 pounds. Knu-Vise, Inc., Detroit 6.

FLOODLIGHT

The Birdseye reflector floodlight has a silver reflector lining to provide a light beam which is moderately concentrated between an 0-60-deg. zone, fading to a soft diffusion at its edges. Suitable for supplementary



lighting where higher intensity than given by general lighting is wanted. Lamp fits standard socket, and comes in four sizes: 100, 150, 200, and 300 watts. Claimed average life is 1000 hours. Wabash Corp., 335 Carroll St., Brooklyn 31.

INDUSTRIAL TIRES

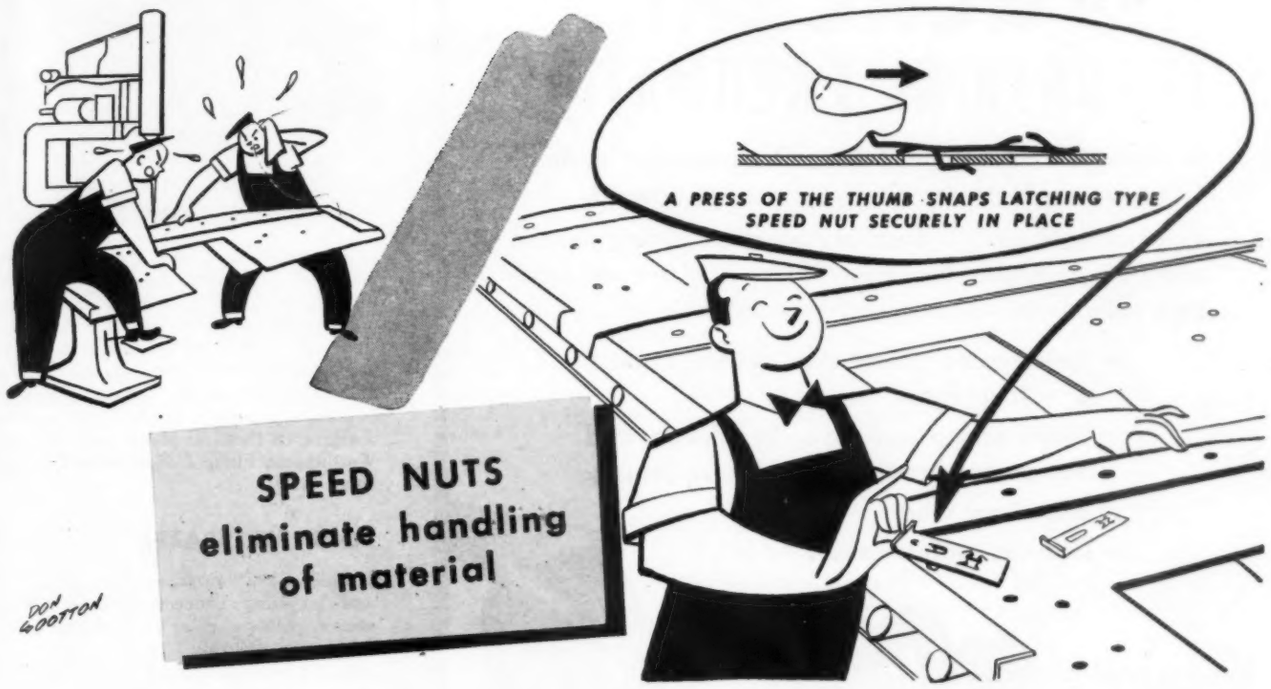
Made with a synthetic rubber compound, tires are available in standard sizes, in both the Vulc-On and Pressed-On types. For industrial use, they are claimed to resist the destructive action of oils, greases, and brines; to have reduced rolling resistance; and to have maximum resistance to cutting and chipping. The B. F. Goodrich Co., Akron, Ohio.

VARIABLE STROKE PUMP

Automatic Variflo is a high pressure triplex pump having stepless 0-100 percent capacity variation. Crankshaft is located at the base, in fully enclosed frame. Automatic pressure lubrication is provided by a direct driven gear oil pump which also provides oil pressure for operating the hydraulic stroke control cylinder. Stuffing boxes are on top of the cylinder where they can be packed and adjusted without difficulty and are visible. Complete variable stroke mechanism is self-contained

Why clinch, stake or weld ?

Just snap in a latching SPEED NUT


A PRESS OF THE THUMB SNAPS LATCHING TYPE SPEED NUT SECURELY IN PLACE
SPEED NUTS eliminate handling of material
DON GOOTON

A SPEED NUT CASE HISTORY

A motor truck manufacturer used a battery of machines to clinch nuts in place for assembly of dash to cowl and attachment of instruments and equipment to dash. Two men were required to operate each machine . . . to handle the large stampings and position them for attachment of the fasteners. This extra handling meant frequent damage to stampings, and then after painting, nut threads had to be re-tapped.

30 self-retaining Speed Nuts are now snapped in place by hand on each stamping as it moves from the press department on conveyers. The entire assembly is completed in much less time, machines eliminated and costs substantially reduced.

Sure, there are a lot of ways to attach nuts to mid-sections of panels for blind location assembly, *but* they require expensive equipment, valuable floor space and skilled operators. Panels must be taken off conveyer, carried to press or welder and carefully positioned to attach the fasteners.

Now with Latching type Speed Nuts, panels stay right on the conveyer, and the assembler merely snaps the Speed Nuts in place by hand. These Speed Nuts are *self-retaining*, holding themselves firmly in place until the screw is driven from opposite side. Moreover, Speed Nuts provide a spring tension lock that holds tight under the most severe vibration.

We've developed many types of self-retaining Speed Nuts to simplify and reduce the cost of blind location fastening. We'll be glad to show you how they can improve the assembly of your product. Send in your details today!

TINNERMAN PRODUCTS, INC.

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In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London
In France: Aerocessoires Simmonds, S.A., Paris
In Australia: Simmonds Aerocessories, Pty. Ltd., Melbourne

Speed Nuts* PATENTED

MORE THAN 3000 SHAPES AND SIZES

* Trade Mark Reg. U. S. Pat. Off.

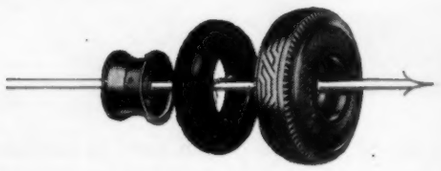
FASTEST THING IN FASTENINGS

LOADS AND EQUIPMENT ROLL EASIER... FASTER ON GENERAL INDUSTRIAL PNEUMATICS

● Material handling trucks and equipment without Generals' mobility are obsolete when purchased.

General is the only Industrial Pneumatic giving you the extra-capacity wide-base rim...heavy duty tire and separate tube *assembled as a quick-demountable* wheel unit.

★ Rolls easier, faster over rough, smooth or soft surfaces.
★ Stops cargo spillage, breakage and equipment breakdowns due to jolting.
★ Ends floor wear.
★ Reduces maintenance.



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SPECIFY General Industrial Pneumatics on the new plant equipment you buy.

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THE GENERAL TIRE & RUBBER COMPANY
AKRON, OHIO

8" to 22" o. d. for loads of 180-1900 lbs. per tire.
U. S. Army Air Corps Standard

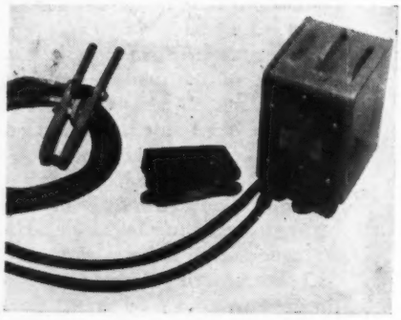
NEW
PASSENGER "AEROSTAND"
Designed and built by PACIFIC ENGINEERING CORP., Los Angeles
Equipped with 16 x 5.00-8 GENERAL INDUSTRIAL PNEUMATICS
The GENERAL TIRE

INDUSTRIAL PNEUMATIC TIRE-TUBE-WHEEL UNITS

in the crank shaft and functions on the principle of varying the position of the eccentric to suit the desired stroke or pumping capacity. May be driven with a constant speed motor or turbine, and can be used for all free-flowing liquids. Said to be suitable for product pipeline pumping, hydraulic extrusion presses, and product charging in chemical plants and refineries. Worthington Pump & Machinery Co., Harrison, N. J.

PORTABLE BRAZER

Portable 5-kva. brazer, weighing 30 pounds, and requiring connection to a 220-volt source, consists of a transformer, voltage selectors, controls, and carbon-tipped tongs. Alternating current from adjustable voltage transformer passes through tongs and parts to be brazed, raising temperature to a point at which rod or ribbon form



of brazing alloy melts. Three outlets are provided on the control panel for 8, 6, or 4 volts. Foot switch with pilot cable is primary control switch for the air cooled unit, which has a carrying handle. Said to be suitable for making lap joints in copper strap, attaching terminals to cable, brazing coil ends, and general coppersmithing work. Westinghouse Electric Corp., Box 868, Pittsburgh 30.

PLASTIC SEAT

Solid one-piece molded toilet seat, made of phenolic resin, is said to be moisture-proof, shatter-proof, fireproof, and unaffected by cleaning chemicals or compounds. Hinges, enclosed in water-tight and dust-proof plastic housings, are constructed to

TAKING THE BLUES OUT OF BLUEPRINTS!

1. Slowdowns, bottlenecks, "reconversion blues" —your desk piled high with headaches, and head bulging with worries.

3. And what it does for you, it does for everyone else in the plant. Coffee is everybody's favorite! Just watch people brighten up . . . whenever the coffee wagon comes 'round!

COFFEE AT-THE-JOB IMPROVES MORALE . . . STEPS UP EFFICIENCY!

2. But wait—here's help! What a wonderful aroma—it's coffee, ready to build up your morale, sharpen your reactions, brighten up your brain—*Give you ideas!*

It's a proven fact—coffee does it every time. A recent nationwide survey on coffee in relation to in-plant feeding made by independent research organizations furnishes conclusive proof that coffee served on-the-job steps up production, raises efficiency, improves morale. *The report of this survey is available to management.* It's packed with facts not only about the results of in-plant feeding but is a mine of useful knowledge on successful procedures. A copy is yours for the asking. Just write on your letterhead.

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120 Wall St., New York 5, N. Y.

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NOW ...A TOUGHER, LONGER-LASTING LOW-COST PROTECTIVE COATING

NEOLAC *armor coats* metal, wood and concrete against acids, alkalies, water, alcohol AND AGE. For, when NEOLAC dries, it leaves a tough film of pure plastic impervious to fumes and weather. NEOLAC is *non-oxidizing* . . . resists crazing and checking; puts up an air-tight defense against corrosion.

NEOLAC brushes on easily . . . dries quickly, even over most painted surfaces. And the most severe tests forecast *longer life than any known oil-base paint.* Now it's ready to cut your maintenance costs. Available in Black, Gray, Green, Clear and Ready-Mixed Aluminum.

- LOW ORIGINAL COST
- GALLON COVERS 450 SQ. FEET
- NO PRIMER NEEDED . . . 2 COATS AMPLE
- LEAVES NO SKIN IN CAN . . . NO WASTE
- EXTREMELY LOW PERMEABILITY
- RESISTS HEAT UP TO 265° F

SPECIAL **Introductory Offer for Comparative Test Purposes**

One quart of either Neolac Black, Gray, Green, Clear or Aluminum, plus one pint of Neolac Thinner, $2.80 prepaid anywhere in the U. S. A.

NEOLAC protects structural steel, walls, bridges, tanks, machinery, elevators, fences, cement blocks, brick, stone . . . most everything.

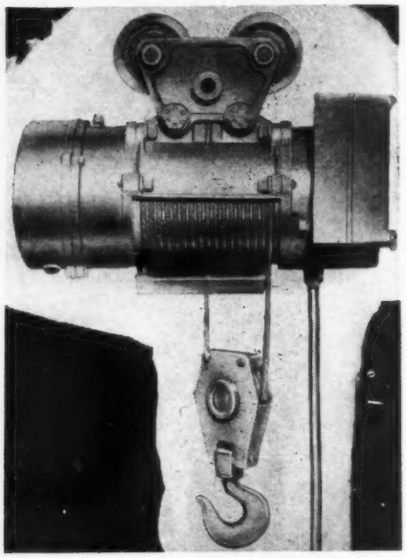
CHAMBERLAIN ENGINEERING CORPORATION

5000 BRIMFIELD RD., AKRON 9, OHIO

prevent seat from being slammed up or down, but permit it to be easily raised or lowered. The Model 50 seats are open front, and made in both black and white finish to fit all standard bowls, either regular or elongated. Sperzel Co., Dept. FM, 911 Hennepin Ave., Minneapolis 3.

ELECTRIC CABLE HOIST

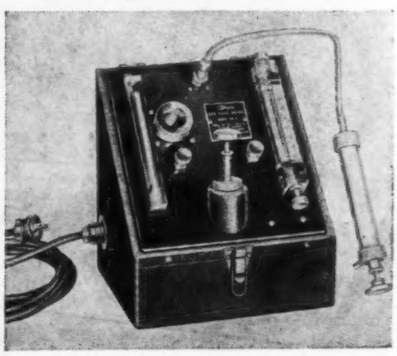
Known as the Bob-Cat, electric cable hoist has motor mounted inside wire rope drum to permit weather- and dust-proof operation while providing a 20-ft. lift at 21½ f.p.m. for weights up to 1 ton. Unit is said to have a 100 percent overload, and to be adaptable for use as a quick-lift hoist with a speed of 45 f.p.m. at a capac-

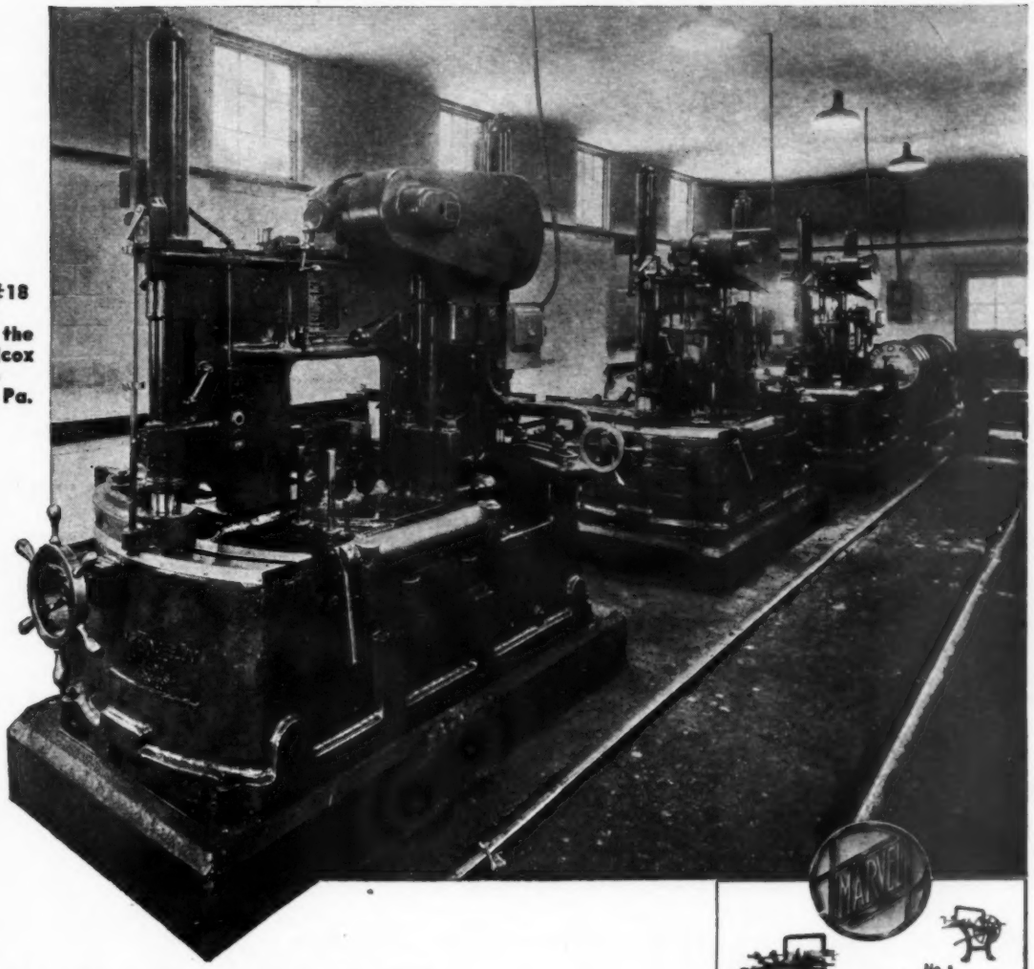


ity of 1000 pounds. Hoist has 24½-in. length and 15-in. width, weighs 310 pounds complete with trolley, and operates on 220/440-volts a.c. at 60 cycles. Maker claims that internal design divides by two the tooth and bearing pressures on the gear trains, increasing life and efficiency. Lisbon Hoist & Crane Co., Lisbon, Ohio.

DEW POINT INDICATOR

Dew point, relative humidity, grains moisture per pound, and latent heat of any noncorrosive gas are said to be determined by Model 8 indicator. Adaptable for air conditioning and refrigeration work; use in connection with controlled atmospheres in furnaces; and in the chemical indus-





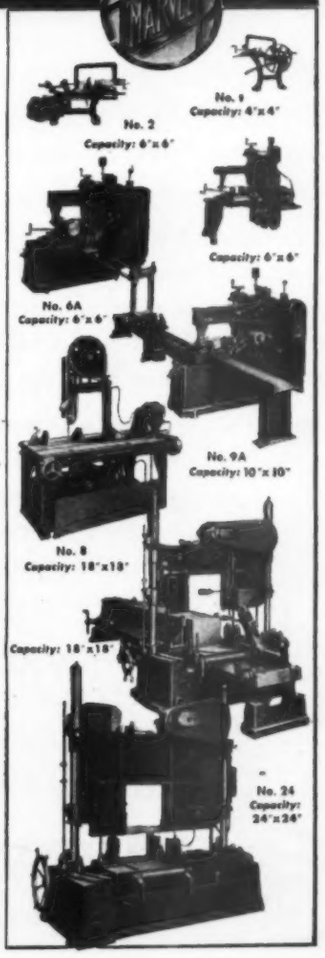
3 MARVEL #18 Hydraulic Hack Saws at the Babcock & Wilcox Tube Co.— Beaver Falls, Pa.

EASILY CUT-OFF TOUGHEST STEELS

Steels just don't come too tough for MARVEL Giant Hydraulic Hack Saws. Take for example, the three No. 18 MARVEL Saws, at the Babcock & Wilcox steel mill, shown above. These machines are used to cut test specimens from sample pieces of stainless and other tough alloy billets which are checked for seams, pipes, etc., before being drawn into tubing. It takes tough steel to make the best tubing, and it takes modern sawing equipment to cut it rapidly, accurately and economically.

With 10 types of metal-cutting saws, each available in a series of variations, MARVEL can furnish sawing machines that exactly meet your requirements. If you have a metal-sawing problem—call in the local MARVEL Sawing Engineer.

Write for MARVEL Catalog or check it in your Sweet's Catalog Files



ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Avenue **Chicago 39, U. S. A.**

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

Teaching Boxes To Switch Themselves

THESE large filled boxes switch themselves to their respective packing stations as quickly and unerringly as if they were "steered" by human beings. Yet there are no operators—the switching is done automatically!

The main A-F Live Roller Conveyor Line is equipped with automatic, air-operated pick-up and roll-out sections. At the top of each box there are pins which strike triggers at each station. These operate an air cylinder which lifts the roll-out section so that it becomes a switch from the main conveyor.

This automatic switching is another example of A-F advanced conveyor engineering, the result of 45 years of experience. Whatever your own materials handling or products handling problem, A-F Conveyor Engineers can help you solve it. Write today—for literature or a discussion.

45 YEARS OF SERVICE TO INDUSTRY

THE ALVEY-FERGUSON COMPANY
135 Disney St. *Offices in Principal Cities* Cincinnati 9, Ohio
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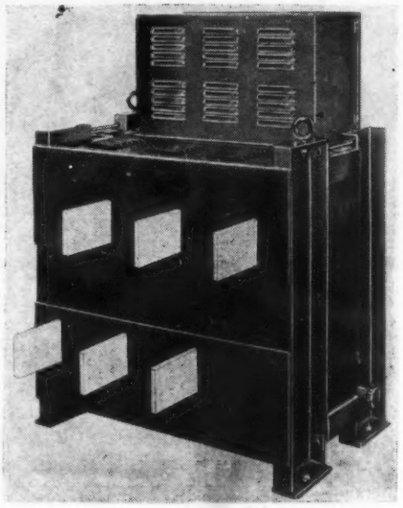
CONVEYING EQUIPMENT
Alvey-Ferguson
METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

try; petroleum industry; paper making; and the production of compressed gases. Indication is taken in an enclosed observation chamber under conditions which can be controlled and reproduced. Condensation takes place suspended in the air or gas sample and the end point or vanishing point may be accurately observed, reducing errors caused by the human element, and permitting consistent determinations by two or more observers, maker says. Instrument is a complete unit, portable, and does not require external cooling means or auxiliary apparatus. Available in two ranges, for dew points between minus 20 deg. F. and room temperature, and for dew points from minus 100 to 0 deg. F. Illinois Testing Labs., Inc., 420 North LaSalle St., Chicago 10.

LOW-VOLTAGE TRANSFORMER

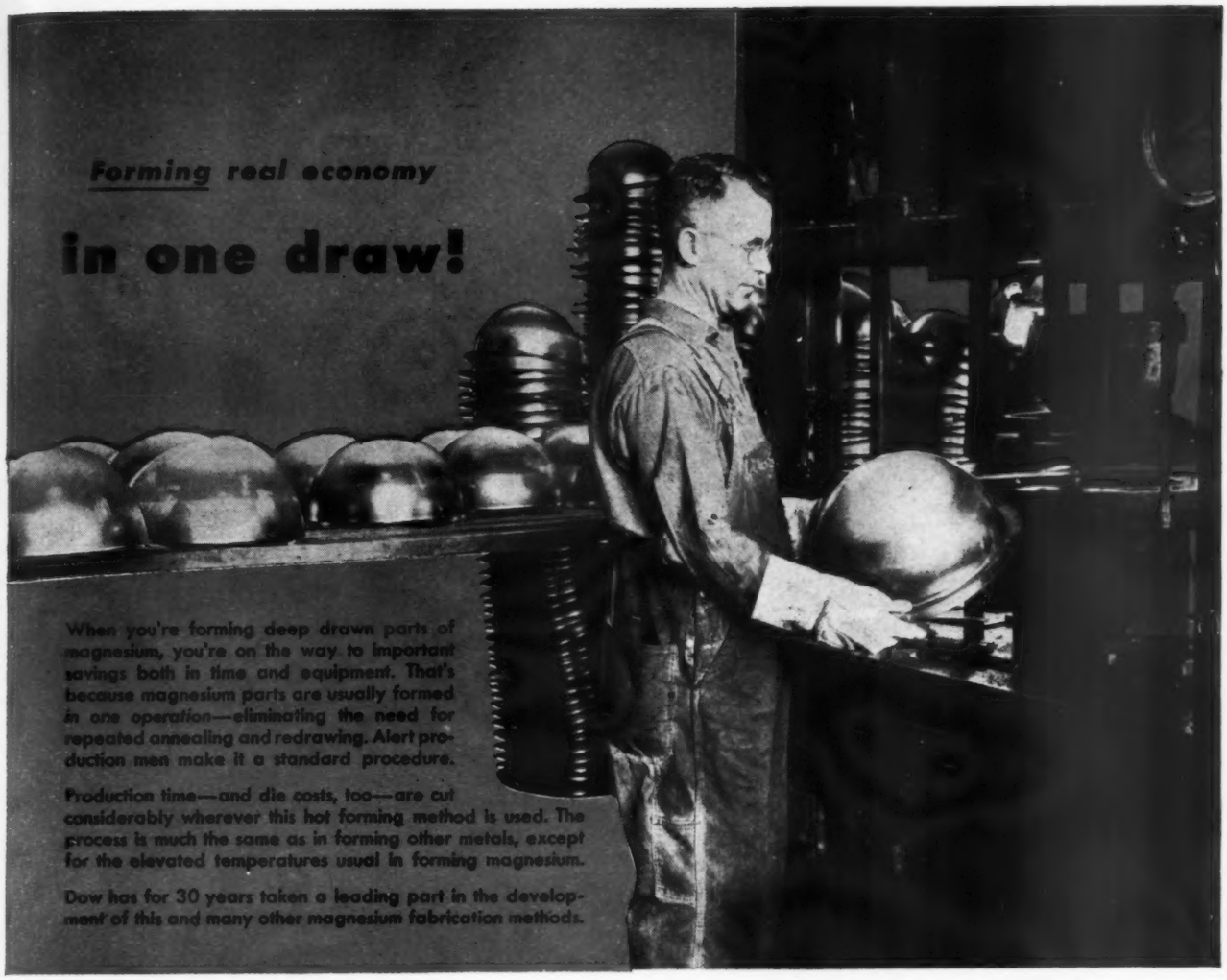
Line of transformers from 5 to 500 kva., suitable for electric furnaces, resistance heating and welding, rectifiers, testing, and similar applications, has been developed. Incorporates built-in switch with safety interlock for changing secondary voltages; ventilation for reducing operating temperatures; and protection of vital



parts against corrosion and dust. Heavy current windings are laminated and transposed to reduce eddy current losses, and heatproof insulation such as fiber-glass, mica, and asbestos is provided. Available for any line voltage and frequency; also 3-phase primary, 3-phase secondary; 3-phase primary, 2-phase secondary; and single-phase. Marcus Transformer Co., Inc., 32-34 Montgomery St., Hillside 5, N. J.

FIRE BLANKET

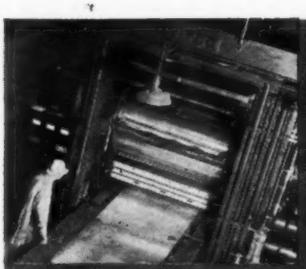
Made of flame-resistant, neoprene-impregnated asbestos cloth, fire blanket measures 60x80 inches. It has ¾-in. grommets for hanging on a simple bracket. Because it remains pliable at all temperatures it can be placed in any area, indoors or out, without a protective container. Blanket is red, is stenciled "Fire Blanket," and is bound with fire-resistant tape. Can be cleaned with soap and water. Applications include smothering fires in buckets or


Forming real economy
in one draw!
When you're forming deep drawn parts of magnesium, you're on the way to important savings both in time and equipment. That's because magnesium parts are usually formed in one operation—eliminating the need for repeated annealing and redrawing. Alert production men make it a standard procedure.
Production time—and die costs, too—are cut considerably wherever this hot forming method is used. The process is much the same as in forming other metals, except for the elevated temperatures usual in forming magnesium.
Dow has for 30 years taken a leading part in the development of this and many other magnesium fabrication methods.

Ready . . . to make products move!

MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS



Dow magnesium, including sheet, plate, strip, and many other forms, is readily available in abundant quantities.

In many cases, light production presses are suitable for magnesium forming. Methods are simple and well defined.

Oil tanks like the one shown above are among the many parts being made by deep drawing magnesium sheet.

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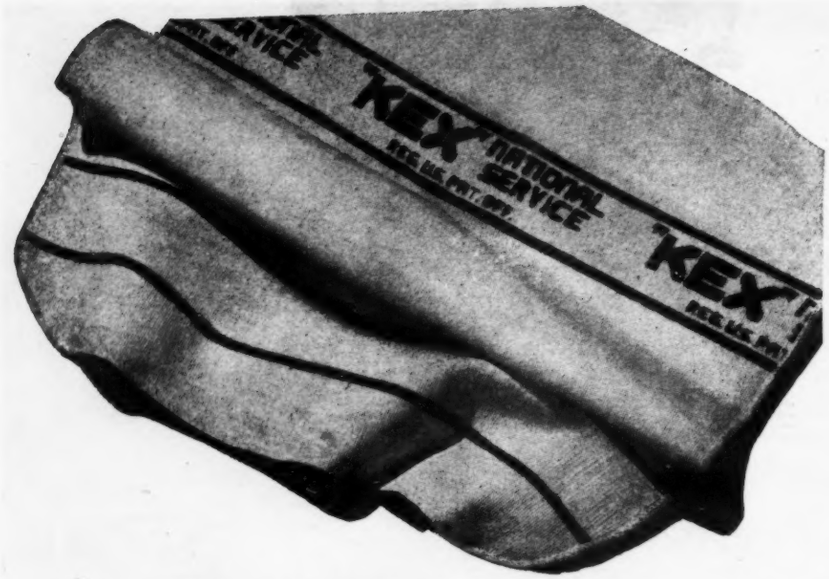
New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle



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can cut your wiping costs

Unlike rags or waste, every square inch of a KEX Wiping Cloth is usable *wiping* surface—right out to the very edge. KEX Wiping Cloths absorb up to six times their weight in grease or oil. They have no buttons, hooks, hard seams, loose threads or any of the million-and-one things that make ordinary wiping materials so hazardous to use. KEX Wiping Cloths are soft, safe for delicate surfaces—yet tough enough for any job in the shop.

KEX Wiping Cloths are delivered as often as needed. They are fresh—chemically cleaned by a *special* high-heat process. You always have plenty of clean KEX Wiping Cloths on hand, in any of your plants no matter where located.

Rent KEX Wiping Cloths and Figure Your Profits

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For complete information, phone your local KEX representative—or write KEX National Service, 295 Fifth Avenue, New York 16, N. Y.

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"KEX" REG. U.S. PAT. OFF. NATIONAL SERVICE A CALLAWAY MILLS PRODUCT INDUSTRIAL WIPING CLOTHS

small containers; covering vents, manholes, or other openings from which flame is issuing; and use as welding screen. Benson & Associates, 310 South Michigan Ave., Chicago 4.

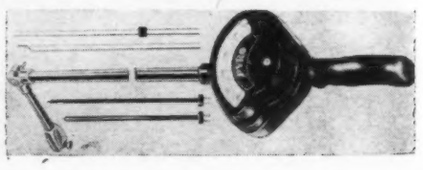
BATTERY CHARGER

Single-circuit battery charger, for 60-cycle, three-phase power circuits, automatically controls charging current for industrial-truck batteries during the entire charge at charging rates established by the electric truck and battery industry. It also

automatically shuts off at completion of charge. When charging Edison batteries, a time clock must be set. Unit, which is 12½x15½x23 inches in size, charges one battery at a time, requires from 7 to 9 hours for a charge, and uses a 1½- or 3-hp. motor. Electric Products Co., 1725 Clarkson Rd., Cleveland 12.

IMMERSION PYROMETER

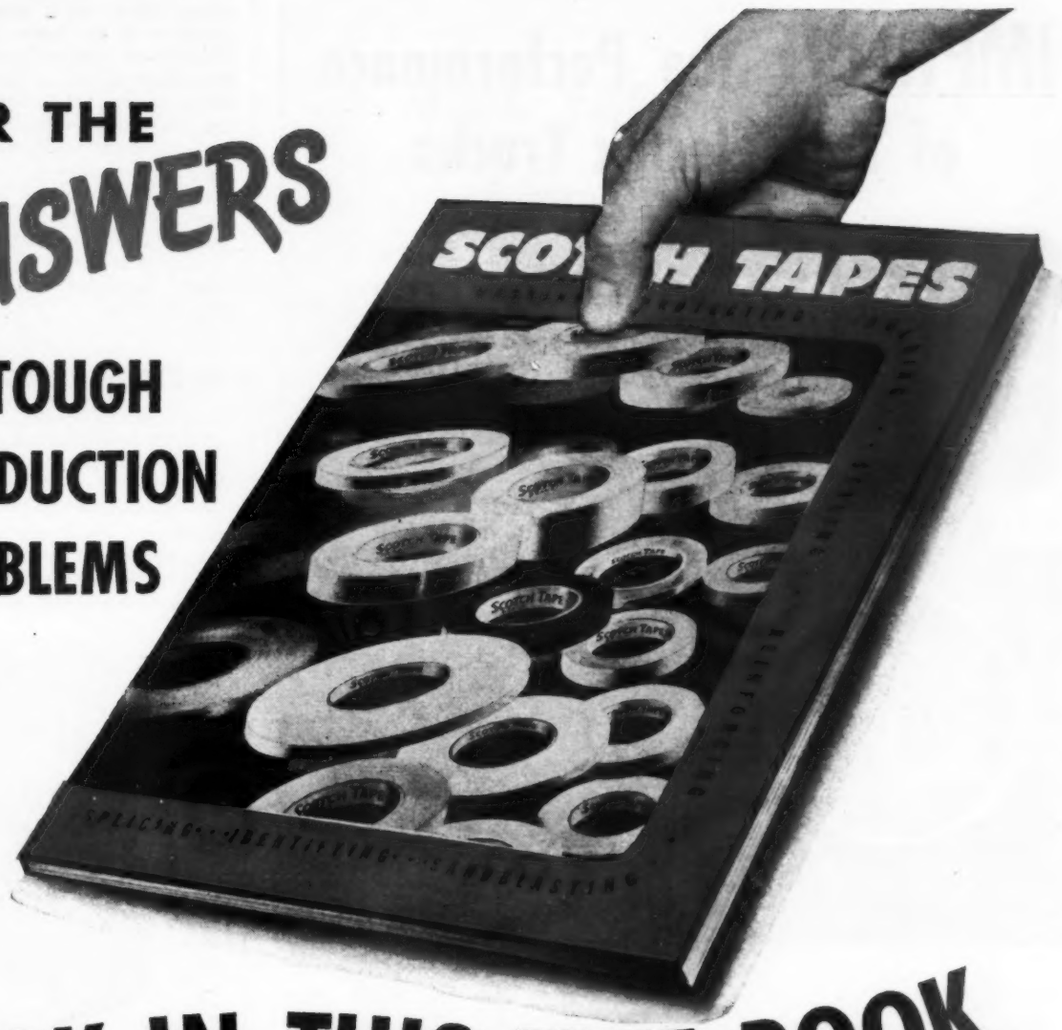
Pyro immersion pyrometer designed for the non-ferrous industry includes 4-in. direct reading scale calibrated from 0-1500 deg. F or 0-2500 deg. F or equivalent Centigrade. Two models have over-all lengths of 27 inches and 43 inches, and both have



FOR THE

ANSWERS

TO TOUGH PRODUCTION PROBLEMS



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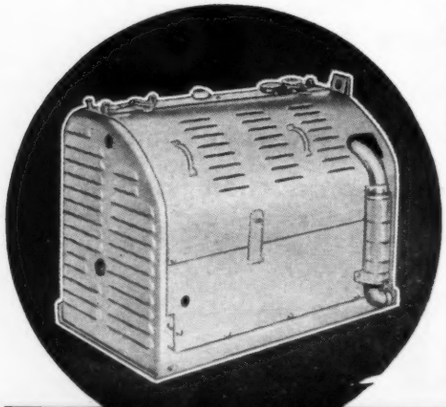
"SCOTCH" is the registered trade-mark for the adhesive tapes made by the 3M Company.

IMPROVE the Performance of Your Electric Trucks

When equipped with Ready-Power units, the performance of electric trucks is sharply increased by as much as 25% to 50% *more loads* per day. Ready-Power units replace storage batteries and provide a *continuous* source of electric power generated right on the truck chassis. All the convenience and easy handling characteristics of electric trucks are retained and improved. There are no slow downs . . . "down time" is eliminated. Thus, your electric trucks give continuous operation and peak performance 24 hours of every day in the year.



It will pay to convert your present electric trucks to Ready-Power. Specify Ready-Power on new truck purchases.

THE READY-POWER CO.

3820 Grand River Ave. • Detroit 8, Mich., U.S.A.

a notched swivel 8 inches from the connector block which permits use of the pyrometer at any angle without loosening. Can be used with bare metal and protected type thermocouples. Thermo-electric system is constructed with a permanent magnet, low resistance type galvanometer, has an internal automatic cold end compensator in addition to an external adjusting screw, and is enclosed in a shock-, moisture-, and dust-proofed steel case for protection from demagnetization or interference from magnetic surroundings. Pyrometer Instrument Co., 103 Lafayette St., New York 13.

ELECTRONIC DUST REMOVER

Known as Precipitator, unit is said to remove 90 percent or more of all airborne dirt by electrostatic precipitation, when installed in ductwork systems of industrial air circulating and air conditioning equipment. Used also to remove smoke, dust, pollen and oil mist, unit consists of three principal parts: dust-collector cell, ionizer, and power supply. On some units

washing equipment is self-contained; on other models the collector plates are removed for cleaning about once a month. Smallest unit, handling 1200 c.f.m., is said to be sufficient to clean, by recirculation, a room 35x35x12 feet. Complete with ¼-hp. motor blower, it is enclosed in a cabinet measuring 26x27x54 inches. Consumes 50 watts, using any 115-volt, 60-cycle source. Raytheon Mfg. Co., Waltham 54, Mass.

CONDUCTIVITY CELL

Type CEL-F wand-type cell which can be immersed in a vat or tank and withdrawn after readings are taken, consists of a heavy-walled industrial Pyrex glass wand with a hard-rubber handle. The glass body measures approximately 1-in. o.d. by 20-in. length. The electrodes are of platinized platinum. Wand is plunged into the liquid and the conductivity read off in any desired terms from a correspondingly calibrated solu-bridge or conductivity bridge. The cell is suitable for checking the strength of industrial solutions in tanks, vats, or baths. It eliminates need for taking samples from bath or tank, as well as the use of small and fragile conductivity cells. Operator can stand off at a safe or

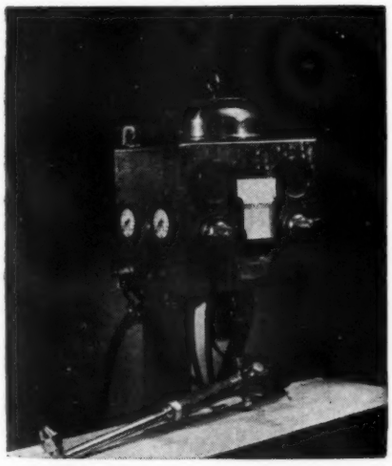
convenient distance. Cell is provided with heavy rubber-covered leads, and is available in a range of cell constants. Although used as a dip cell, it can be clamped and left in place. Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J.

GRINDING DUST COLLECTOR

Featuring pressureless build-up that is said to assure continuous equal suction at throat of hoods, integral grinding dust collector is announced. Fan unit of high static pressure type overcomes resistance of collector unit and develops 2-in. w.g. or more at throat of coupled hood. Has two precipitating elements, one for coarse, the other for fine dust. Where extra-fine (hazardous but non-explosive) dust is encountered, an electrical secondary, operating from a standard lighting circuit, may be added. Aerotec Co., White Plains, N. Y.

WELDING SYSTEM

Consisting of a torch with a patented nozzle and 16 independent controls, a control box with air and gas pressure regulating valves, and a canister from which powdered materials are fed through the flame, welding system is announced. The flame is generated and controlled by preselected combinations of gases and air. Applications include hardfacing, surfacing with plastics or synthetic enamels, brazing with powdered alloys, welding with pow-



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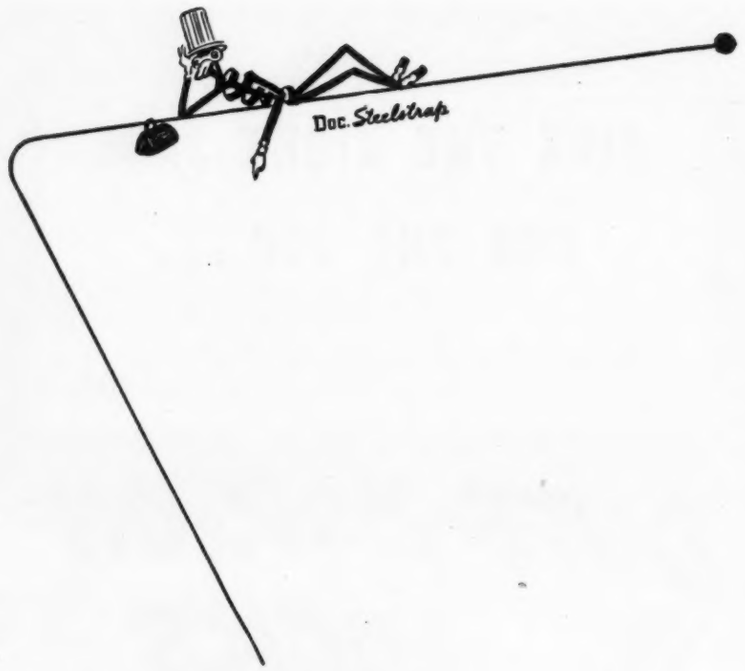

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ACME STEEL COMPANY

dered metals, rod welding with projected fluxes, controlled atmosphere welding, conventional torch and rod welding, and metal spraying. Powder Weld Co., 419 Kent Ave., Brooklyn.

GLOVE FINGER GUARDS

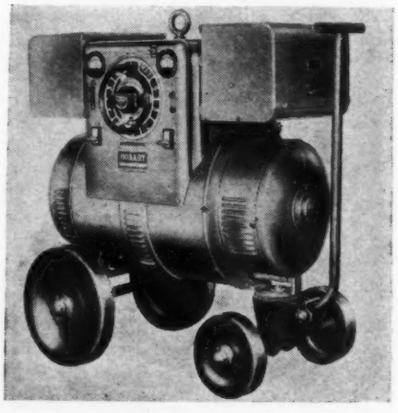
Leather pullover guards for fingers or thumb of standard cotton gloves are offered for use by punch press operators and employees handling sharp, jagged small castings and stampings. Guard is steel reinforced and steel stitched, to give long wear and protection against cuts. Reinforcement on both sides permits guard to be reversed. Adjustable tape at wrist end holds it in place on the glove. Industrial Gloves Co., Danville, Ill.

FLOOR VARNISH

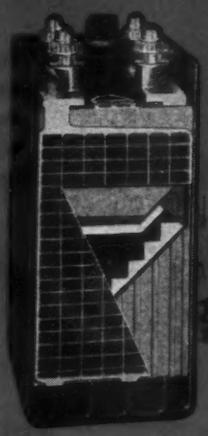
Marble floor varnish is said to rate 83—against a standard of 100 for plate glass—on the "rocker test" for wear and abrasion. Manufacturer claims it resists hot and cold water, fruit acids, alkali solutions, and alcohol; dries in 4 hours and is dust-free in 1 hour. Devoe & Raynolds Co., Inc., 44th St. and First Ave., New York 17.

BATTERY CHARGER-WELDER

Battery charger-arc-welder combination has complete, separate control panels with instruments—one for each battery circuit, and one for the welding circuit. Model No. 496 is a 300-amp. electric-motor-driven welder including MGC panel cir-



DO YOU KNOW WHY THE TREND IS TOWARD *Glass Mat Design?*



KATHANODE CELL

This cut-away view shows the many parts in a complete Kathanode cell. Each is the subject of constant research.

Gould Kathanode power was a startling innovation when introduced to American industry in 1925. Since then the demonstrated superiority of glass mats has resulted in wide-spread use of this form of positive plate protection.

During its 21 years of experience, research and field testing Gould has added many improvements to the original Kathanode design. Incorporated in the now famous Kathanode Unit, and still exclusively Gould, are a specially designed grid, long lasting Black Oxide active material, mats of layered spun-glass, and the Unit-Seal envelop that minimizes short circuits and internal power losses.

Gould research is constant, so look to Gould for leadership in battery developments. Write Dept. 15 for Catalog 100 on Gould Kathanode Glassklad Batteries for Industrial Truck and Tractor Service.

GOULD

GLASSKLAD CONSTRUCTION

KATHANODE

GOULD STORAGE BATTERY CORPORATION, Depew, N. Y.

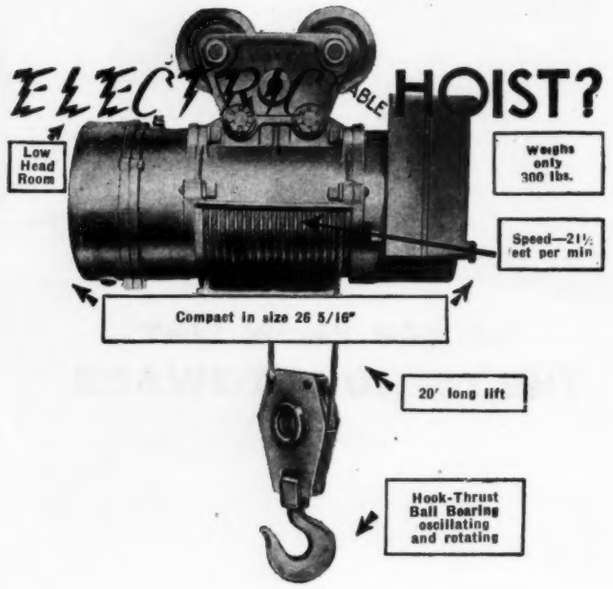
Factories Atlanta • Boston • Chicago Dallas • Depew • Leavenworth • Los Angeles • North Bergen • Rock Island Saint Paul • Salem • Sioux City Zanesville

The BOB-CAT

Arn't These

The Specifications

You Seek in an



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DIVISION OF THE WRIGHT FILE CO.,

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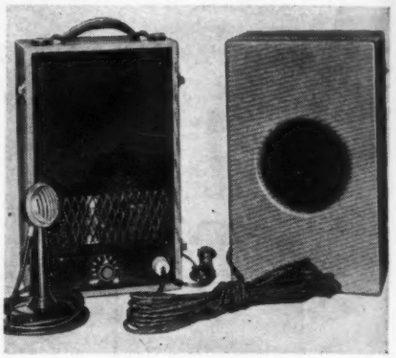
cuit for charging one battery at a maximum rate of 200 amperes at 50 volts, d.c. No. 497 is a 400-amp. electric-motor-driven welder including MGC panel circuits for charging two batteries at one time and at a maximum rate per battery of 150 amperes at 50 volts, d.c. The Hobart Bros. Co., Motor Generator Corp. Div., Troy, Ohio.

PUBLIC ADDRESS SYSTEM

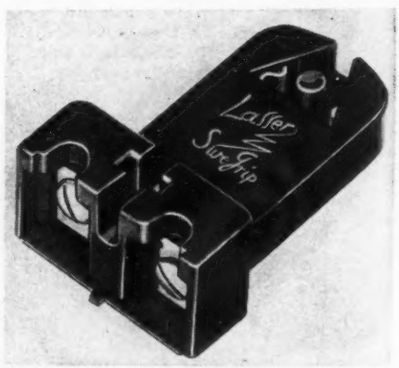
Consisting of a microphone, loudspeaker, and amplifier assembled into one carrying unit measuring 12x9½x15 inches, portable public address system, called Porta-Voice, operates on 110-volt a.c. circuit. A



50-ft. cord makes it possible to place the speaker unit in other rooms remote from the microphone. Can be used for sales meetings, conventions, paging, and announcing. Hollywood Equipment Co., Box 2910, Hollywood 28, Calif.

FLUORESCENT LAMP HOLDER

Lasser Sure-Grip fluorescent lamp holder has a contact design that is said to provide perfect, positive contact even under conditions of severe shock and vibration.



Construction permits easy wiring into fixtures. Body is of durable plastic, with stamped metal inserts. Mastercraft Electric Co., 187 Murray St., Newark 5, N. J.

IMMERSION HEATER

When installed in water tanks, drums, pipelines, and similar locations, automatic electric immersion heater is said to maintain temperature of liquids within 5 deg. F. of setting, ranging from room tempera-

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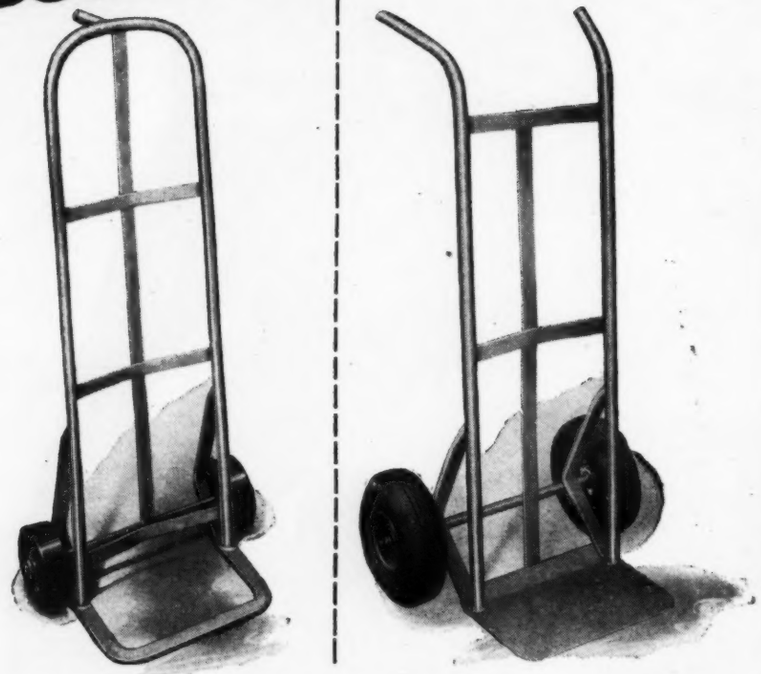
BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

CASES, KEGS AND PACKAGES *can't walk*

but it's easy wheeling with a *WHEEL-EZY*



Cases, kegs and packages can't walk and you're wasting time, labor and money if you lug them about by hand. A Rapids-Standard *Wheel-Ezy* hand truck will give you *easy wheeling* with these bulky objects and will keep your handling costs low. Bottlers, brewers, distributors, super-markets and delivery men are finding increasing use for the Wheel-Ezy. There is a use for at least one in every plant. Strong, lightweight and perfectly balanced, Wheel-Ezy handles loads up to 500 pounds with ease. "Step-Climber" feature makes it possible to go up and down steps in easy fashion. Now available in one and two handled models, open or solid plate nose. Write for literature and price lists — no obligation.

CHOICE OF WHEELS

AGH—Demountable Cushion rubber wheels . . . it's *tough*. MOCH—Moulded on Cushion Rubber Wheels, moulded to metal core. ABK—Plastic wheel with laminated fabric tread, moulded under heat and pressure. MRK—Resinoid Wheels made of sturdy canvas duck, macerated and moulded under heat and pressure. Plain or Roller Bearings. NICRO STEEL—Fine quality grain castings, fully machined. Oilite Bearings, zerk lubrication. GP—General Pneumatic with 10" x 3.50" demountable rubber tires.

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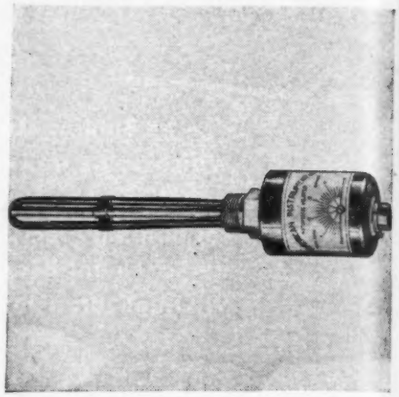
STEEL FORGED CASTERS - TRUCKS - CONVEYORS - POWER BOOSTERS

The Rapids-Standard Co., Inc.

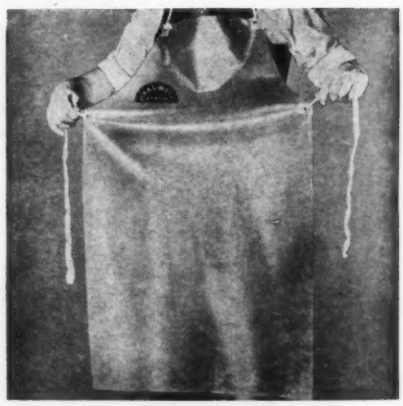
Sales Division—370 Peoples National Bank Bldg., Grand Rapids 2, Michigan



ture to 350 deg. F. Built-in safety control prevents overheating if liquid level falls and exposes heater. Element can be screwed into the walls of a tank or drum through a 1-in. pipefitting or reducer with a two-wire connection from the current supply to the heater. Two or more of these automatic heaters may be installed on one application and adjusted for step temperature control. Units, rated at 250, 500, 750, and 1000 watts, have copper or steel sheaths, for water or oil. American Instrument Co., Silver Spring, Md.

PLASTIC APRON

Gardwell aprons are designed to protect clothing against oils, stains, acids, and chemicals. Made of a pliable, transparent plastic material, clear in color, and 0.006 to 0.008 inch thick, they are light-



weight and comfortable. Equipped with grommets and tie strings, they come in bib or waist styles in a range of sizes. Safety Clothing & Equipment Co., 7016 Euclid Ave., Cleveland 3.

IGNITION SYSTEM

"Uni-power," for automotive and industrial engines, is a single-unit battery ignition system in which coil, condenser, and distributor have been combined in a molded plastic case with high dielectric properties. Eliminating internal wiring, it weighs about 2¼ pounds. Neon light on rotor arm indicates ignition performance. Features a centrifugal spark advance with positive, accurate spark control which provides maximum ignition performance, optional direction of distributor rotation;

COMPLETE *Finishing* SYSTEMS

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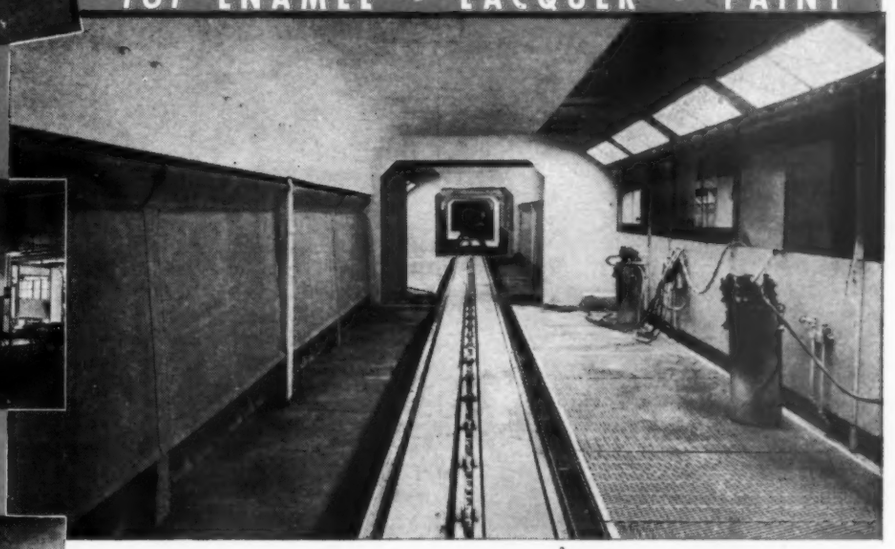
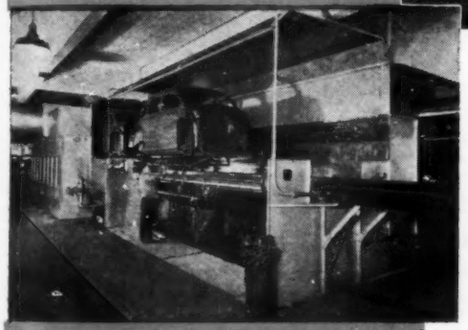
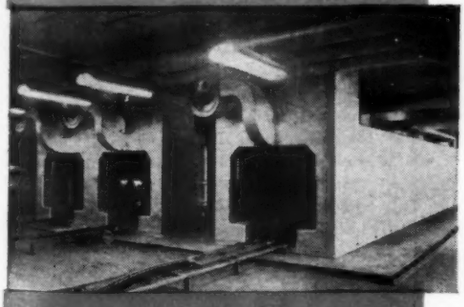
At right and above—Mahon Hydro-Filter Spray Booths for finishing sides and tops of Bodies—part of this Complete Finishing System.





Mahon Hydro-Filter Spray Booths for painting underside of Automobile Bodies—part of same installation.



Typical Mahon Drying Ovens installed throughout this Complete System.

World's Largest, Most Complete Finishing System Designed and Installed by Mahon

The illustrations on this page show major units of the largest Finishing System installed in any plant in the world to date . . . it finishes automobile bodies, fenders, hoods and small parts in one of the great automobile plants of Detroit. Complete in every detail—from Metal Cleaning and Rust Proofing through Prime Coat Spraying and Drying, Wet Sanding and Drying, Sealer Coat Spraying and Drying, Finish Coat Spraying and Drying, to a complete Filtered Air Supply and an elaborate Over-spray Reclaiming System. This is a typical Mahon automotive installation—evidence of the Motor Industry's confidence in the Mahon organization. Today, Mahon engineers, pioneers in this highly specialized field, can point to hundreds of such installations all over the world. If you have a finishing problem in your plant, or are contemplating new equipment of this type, call in a Mahon engineer today . . . you will get the benefit of a wealth of technical knowledge and practical know-how not available to you elsewhere.

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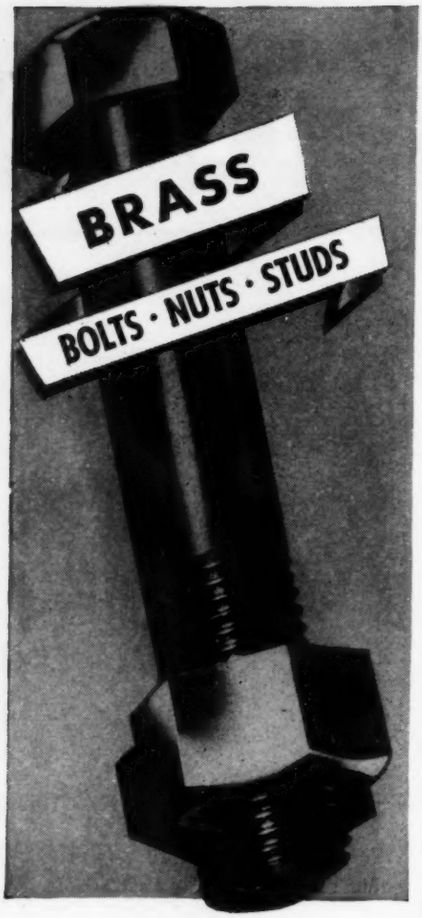
USE HEADED AND THREADED FASTENERS
FOR ECONOMY AND RELIABILITY



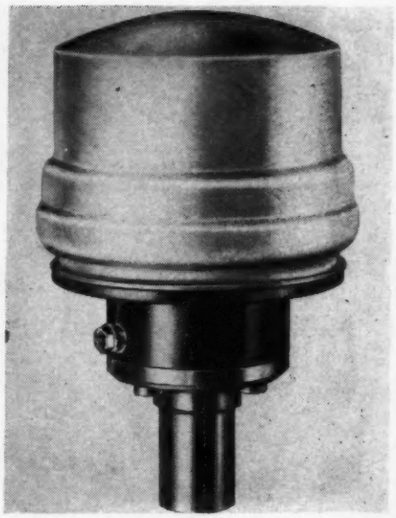
Brass and bronze, all types—every non-ferrous metal—available in every standard dimension or to your specifications.

★

Better Bolts of Iron, Steel, Brass and Other Metals Since 1882.

★

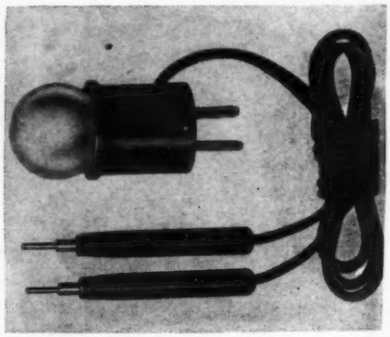
PAWTUCKET
"THE BOLT MAN"
MANUFACTURING COMPANY
327 Pine Street • Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS



observation of internal operation while the engine is running; an aluminum cover which protects against dust and moisture and provides radio shielding; spark plug leads from the bottom of housing, adding to waterproofing; and a neon light on the rotor arm to indicate ignition performance. LaPoint Plascomold Corp., Unionville, Conn.

TEST LAMP

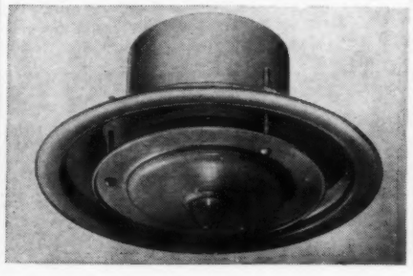
Plug-in test lamp for checking wiring, switches, relays, coils, resistors, starters, fuses, generators and ignition systems operates on 110-volt outlet. Lamp has four



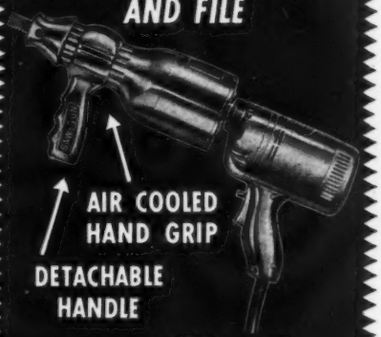
feet of rubber-covered wire, plastic insulated test prods, socket, and indicator light. Hanlan Co., 1419 West Jefferson Blvd., Los Angeles 7.

AIR DIFFUSER

Design of the Type K Kno-Draft adjustable air diffuser has been modified to include a tamper-proof cap at base of damper con-



The Streamlined
SAW GUN
PORTABLE POWER SAW AND FILE



REACHES INTO THOSE HARD-TO-GET-AT PLACES

Gone forever are the days of hard work with an ordinary hack-saw or file. Instead, the New Saw-Gun, propelled by electricity, air or flexible shaft, does the work quickly and easily. No need for laborious, tiring manual effort. Now you can do the job in a jiffy. Just pull the trigger and ZIP, the job is done. A natural for panel, slotting and notching in Stainless Steel and other metals, wood, plastics, etc. It's portable, carry from job to job. Saves loads of time.

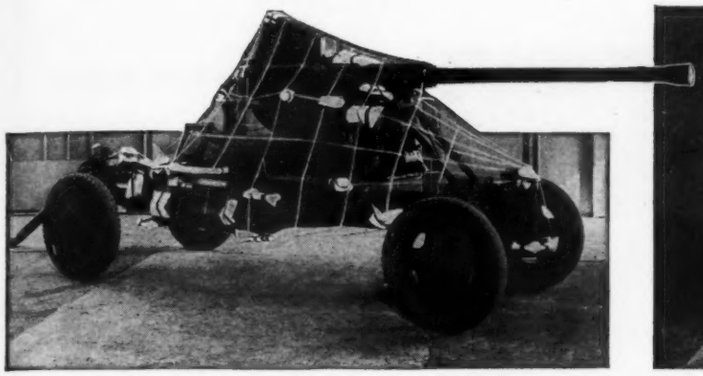
Photo shows how easy it is to reach those out-of-the-way sawing jobs with the Saw-Gun. Rapid 7/8" stroke permits sawing in tightest spots. Pistol-grip handle may be removed where necessary and air-cooled, ribbed hand grip used to guide saw. Right now, the Saw-Gun is a preferred tool in thousands of tool rooms and tool kits. Make it a point to become a Saw-Gun owner at once. You'll be mighty glad you did.

WRITE FOR COMPLETE DETAILS AND PRICES . . . IMMEDIATE SHIPMENTS

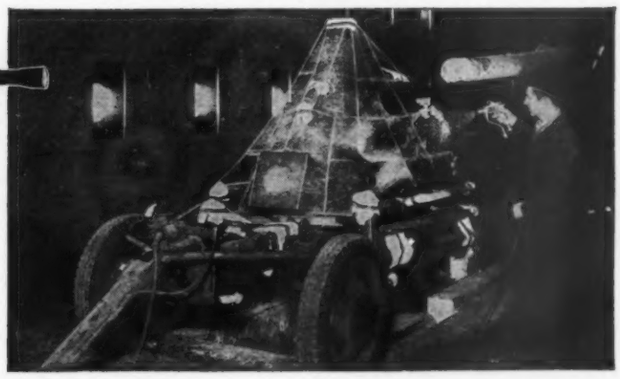
Mid-States
EQUIPMENT
CORPORATION
2429 South Michigan Ave.,
Chicago 16, Ill.

You've heard so much of plastic miracles

NOW MEET ONE!



1 Narrow tape is laid crisscross touching only projections of gun previously padded. Here's how Army and Navy start preparing ordnance for *safe* storage.



2 Special plastic material sprayed from DeVilbiss guns miraculously fills open spaces with gossamer cobwebs, bridging gaps of up to 16 inches.

3 Finish of webbing operation in modern, 60-foot DeVilbiss Spray Booth. Next spray guns apply three finish coats of a more liquid plastic.

Photos taken at Army's Erie Ordnance Depot.

4 Moisture-proof plastic "cocoon" completed, guns are safe for years—even in open. At any time film can be stripped off in two minutes.

HERE'S one plastic miracle that would be impossible without modern spray equipment, development of which has been so largely a DeVilbiss achievement. And at Erie Ordnance Depot, where much of the Army's materiel is being prepared for retirement, you find the time-honored DeVilbiss name on all such equipment. Even to the 60-foot spray booths which so efficiently exhaust spray vapors and ventilate the working areas!

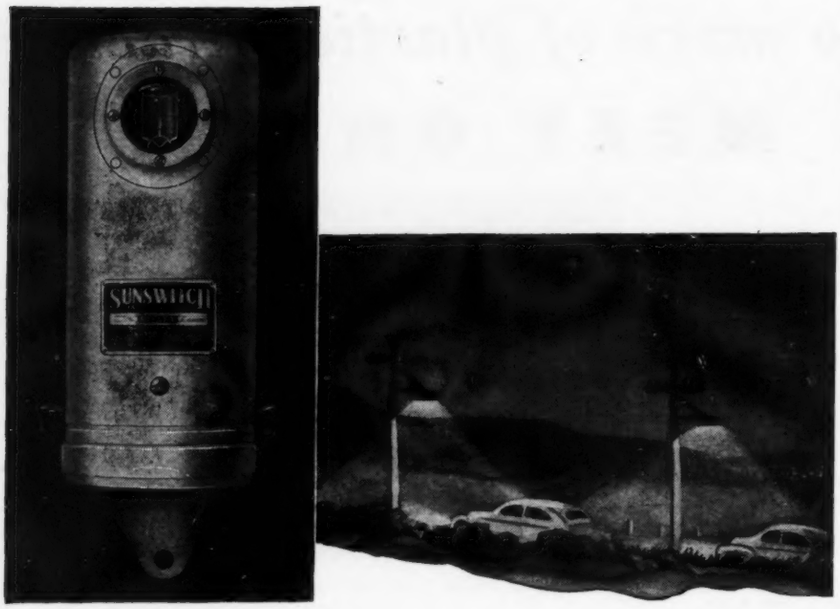
For unusual jobs like this or the conventional, *you* can always trust DeVilbiss Leadership to provide the complete spray system that will save you the most in time and money. And deliver the best results!

THE DEVILBISS COMPANY • TOLEDO 1, OHIO
Canadian Plant: WINDSOR, ONTARIO

DE VILBISS

means **Quality** *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS



Tested for four Years

Back in 1941 our engineers had completed the design of a new street-lighting control which unfailingly insures adequate illumination regardless of changes and fluctuations in weather and the twilight hour.

Wartime obligations prevented production, but for four years the engineers' prototypes have been tested under actual street-lighting conditions . . . time-proven, it is now offered as our

SUNSWITCH
LIGHT CONTROL

A practical and rugged unit with 100 percent safety factor . . . its sturdy components assure a negligible maintenance cost. Tooling up for large scale production is now completed. Write for Bulletin No. 8239.

The SUNSWITCH can also be used to control illumination of public buildings, outdoor advertising, airport beacons, radio mast running lights, and ships' running lights.

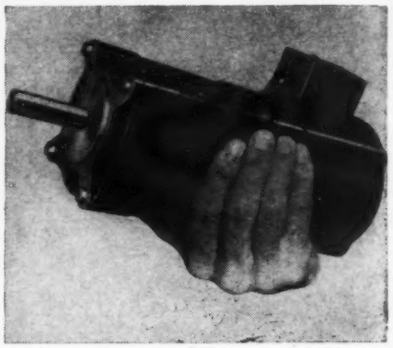
The **RIPLEY** *Company*

29 NEW LITCHFIELD STREET TORRINGTON, CONNECTICUT

trol screw. Cap can be removed only with a Phillips-head screwdriver to provide access to the damper screw. This feature is said to allow volume control damper to be set for the required amount of air without danger of tampering which might upset the system's balance. W. B. Connor Engineering Corp., 114 East 32nd St., New York 16.

EXPLOSION-PROOF MOTOR

Compact and lightweight, 2-hp. explosion-proof d.c. motor is suited for such continuous-duty applications as fan and blower, pump, winch, and other drives, where the source of power must be fitted into a small space. With an armature speed of 9000 r.p.m., the motor can be supplied for lower-output shaft speeds by inclusion of a built-in gear reducer, which is said to



add only 2 pounds to basic weight of 15 pounds. Motor shaft is ball-bearing mounted, and motor windings are protected with glass insulation and high-temperature varnishes, permitting continuous-duty operation with a temperature rise of 75 deg. C, over an ambient temperature of 25 deg. C. Motor can be supplied for operation on 28, 32, or 110 volts, d.c. Electrical Eng. & Mfg. Corp., 4606 West Jefferson Blvd., Los Angeles.

ELECTRONIC AIR FILTER

Electro-Cell, a unit type electronic air filter with removable collector plate assemblies, is manufactured in a range of sizes which can be combined to provide any multiple of the capacities of the basic units. Standard sections of the filter are 2 and 3 feet in width with an approximate capacity of 1000 and 1500 c.f.m. per unit re-

HERE'S the umpteenth test or inspection Nicholson and Black Diamond files go through before they're permitted to face the world under the Nicholson guarantee of *Twelve perfect files in every dozen.*

It's the "ringing" test for soundness. The inspector taps the file on a metal block or anvil. If its ring is a clear "plink," the verdict is "okeh." If a dull "plunk," most likely there's an invisible "water crack" somewhere . . . and the file is immediately rejected.

Every Nicholson and Black Diamond file is given the "ringing" test—as well as many other tests and inspections. No important step in its manufacture is left unguarded. As a result, these famous files come to you with unsurpassed uniformity—in shape, dimensions, cut, hardness and soundness.

• • •

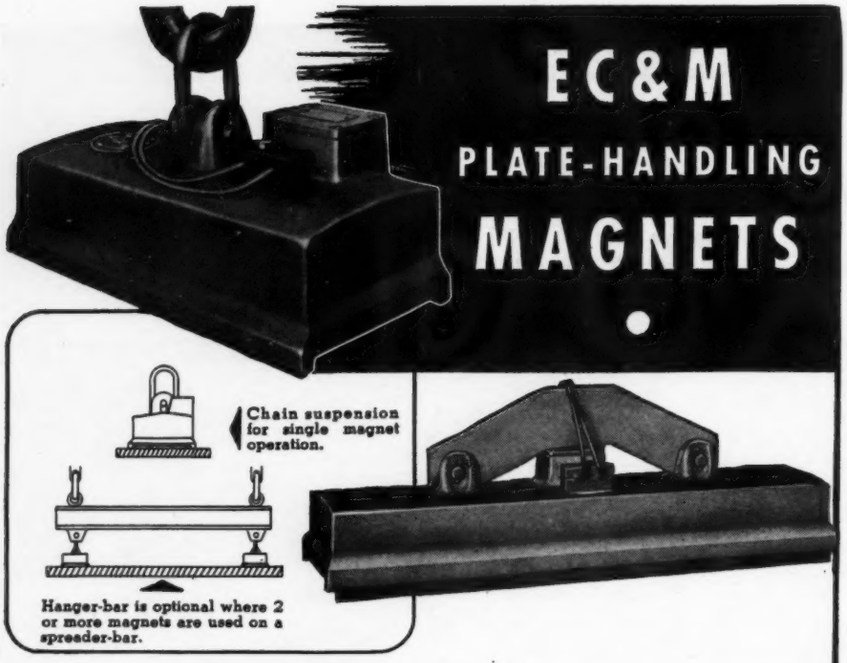
• No matter what the requirement, more than 3000 kinds, cuts and sizes in the Nicholson and Black Diamond lines make available *The right file for the job* . . . thus making possible top-speed filing production and maximum filing efficiency. ***Order Through Your Mill-supply House.***

NICHOLSON U.S.A.

NICHOLSON FILE CO. • 27 ACORN STREET, PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

BLACK DIAMOND TRADE MARK

NICHOLSON FILES *FOR EVERY PURPOSE*


EC&M
PLATE-HANDLING
MAGNETS
Chain suspension for single magnet operation.
Hanger-bar is optional where 2 or more magnets are used on a spreader-bar.

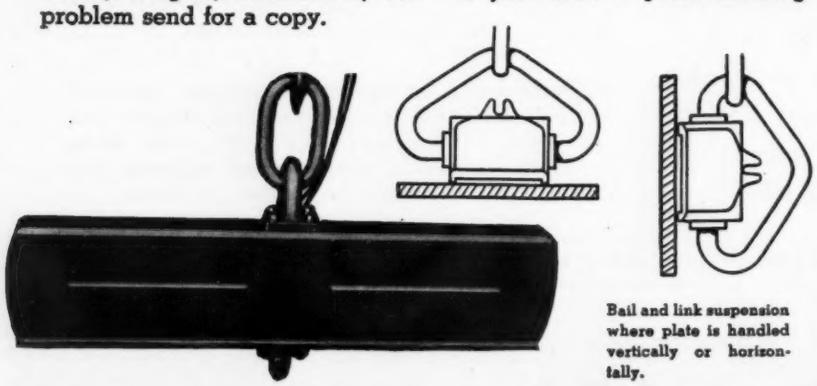
●These are EC&M Type P and Type F Magnets, designed specifically for handling sheet or plates, either cold or hot, at maximum temperature of 900 degrees or less. They can be worked singly for handling plates of medium-length. For longer plates, two or more magnets can be suspended from a spreader-bar and operated in parallel from one controller.

The advantages of these rectangular, plate-handling magnets are maximum lifting capacity with minimum magnet-weight, ability to handle material without groundmen and increased safety since prying plates apart to affix slings is eliminated.

These magnets are designed for operation on direct current power. Standard magnets have coils wound for 230 volt service. Optional windings for 115 volts and other voltages are available where required. Coils are furnished with either Class A or Class B insulation. Class B insulation is recommended for severe service and is essential for applications in which hot material is handled.

The standard controller for use with these magnets is the No. 0 Type with "Lift-Drop" Push Button Station. Where more than one plate is lifted at one time, operators quickly learn with this controller to be able to drop off plates one at a time until required number are lifted from the pile.

New Bulletin 903 gives complete information,—lifting-capacity tables, weights, dimensions, etc. If you have a plate-handling problem send for a copy.



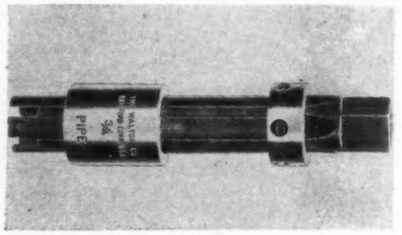
Bail and link suspension where plate is handled vertically or horizontally.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

spectively, at 90 percent efficiency, according to manufacturer. Box-like units are assembled one upon another, by eliminating top and bottom sections to provide a variation of heights from a minimum of 27 inches to a maximum standard height of 15 feet in 9-in. increments. In filters 6 feet or higher the ionizers are mounted on a bar hinge, which swings clear of ductwork or adjacent sections, giving full access to collector plates. An automatic washing device is available which permits collector plate assemblies to be washed in place for installations where manual washing is not feasible. American Air Filter Co., Louisville 8.

PIPE TAP EXTRACTORS

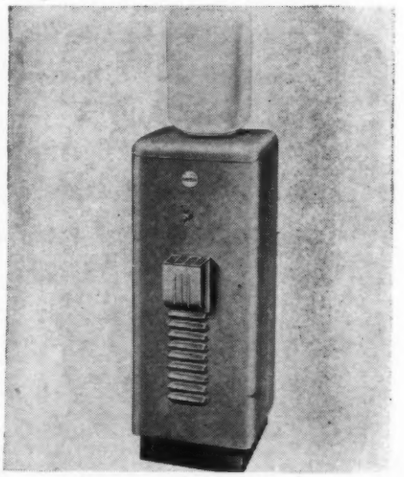
Broken pipe-threading taps can be removed by pipe tap extractors which are made for all sizes from ¼ to 1 inch inclusive, for both regular and interrupted



thread styles. Designed on the same principle as manufacturer's other models for hand and machine screw taps. The Walton Co., 94 Allyn St., Hartford 3, Conn.

BOTTLED-WATER COOLER

Self-contained electric cooler for bottled water is now on the market. Construction embodies same features that are claimed to



give economical, trouble-free operation in manufacturer's other water coolers. Sunroc Refrigeration Co., Glen Riddle, Pa.

RATCHET DRILL-DRIVER

Libefty ratchet drill-driver is designed for drilling between studs and joists, or in other restricted spaces. The tool is pro-

Have you looked into ready-mixed Aluminum Paints – *lately?*

If you're an advocate of job-mixed aluminum paints, this is not an effort to change your mind.

It's just a reminder—that changes take place, improvements come, in the paint field as in every other.

During the past few years, ready-mixed aluminum paints made with Alcoa Albron paste have changed. Alcoa Research has found ways to make possible longer leaf retention—a more stable paste.

Paint manufacturers' research staffs have been busy, too. They have produced improved paint vehicles. These new vehicles are compatible. They don't "fight" the aluminum pigment. The pigment stays bright and smooth.

Job-mixed or ready-mixed, one of the best ways to get a highly reflective, long-lasting aluminum paint job is to make certain that *99% plus* pure Alcoa Albron pigment is used in your aluminum paint. ALUMINUM COMPANY OF AMERICA, 1983 Gulf Building, Pittsburgh 19, Pa.

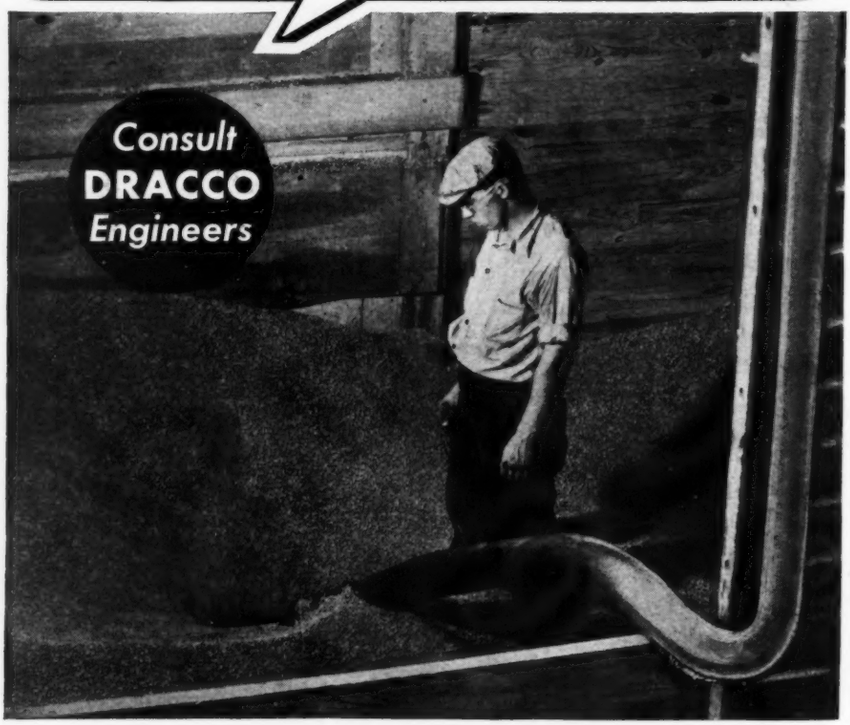
ALCOA ALBRON PASTE

for Aluminum Paint

MADE UNDER PATENTS OF METALS DISINTEGRATING COMPANY, INC. ALBRON

MOVE MORE MATERIAL

in Less Time..with Less Labor



Savings in handling time . . . and savings in labor . . . are advantages that always follow the installation of DRACCO Pneumatic Conveyors. If your plant uses chemicals, grains or granular materials, DRACCO Pneumatic Conveyors will handle them at the lowest possible cost. A DRACCO Pneumatic Conveyor and ONE man often replaces several men, and will do a much better job. Ask DRACCO Engineers to check your material-handling methods and tell you what savings you may expect. These savings will help you to meet postwar competition.

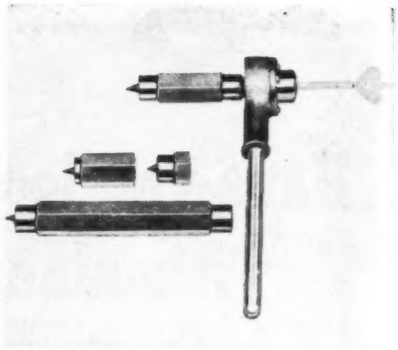
For Further Information Write

DRACCO CORPORATION

4091 E. 116th St., Cleveland 5, Ohio *New York Office: 130 W. 42nd St.*

DUST CONTROL EQUIPMENT

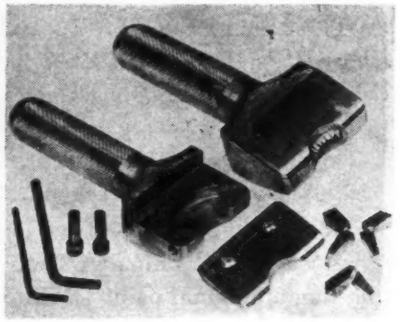
PNEUMATIC CONVEYORS • METAL FABRICATION



tected against dust by compact semi-steel head, which permits centering holes within 1¼ inches of nearest obstruction. Holes up to 3-in. diameter can be drilled by using a long lead screw combined with 1-, 2-, and 8-in. extensions. Adapter chuck permits steel as well as wood drills to be used. Techtmann Industries, 714 West Wisconsin Ave., Milwaukee 1.

CONVEX STAMPING MARKER

Line of convex marking devices for stamping on cylindrically shaped parts has interchangeable steel type tapered to form a pre-determined radius when the marker is assembled. Manufacturer claims that hard-



ened steel anvil at bottom of type-holding recess insures impressions of equal depth and clarity for all characters. Each holder and set of type is for marking on pieces of one radius only. Spacers provide variable type capacity. New Method Steel Stamps, Inc., 147 Jos. Campau, Detroit 7.

AWNING PAINT

Setfast aluminum canvas paint is said to provide substantial protection from heat, and to eliminate glare commonly associated with aluminum surfaces. Manufacturer says the coating does not crack or stiffen the fabric, is water-repellent and sun-resistant, and contains an active fungicide that protects canvas from rot and mildew. Interchemical Corp., Trade Sales Div., Fair Lawn, N. J.

THERMAL METER

Thermal watt-demand meter, Type HI-1, and true single-phase, kva-demand meter have temperature-sensitive, bimetallic spirals that act as their own heaters. Use of this "direct-heat" principle is said to increase life and accuracy of the meter by

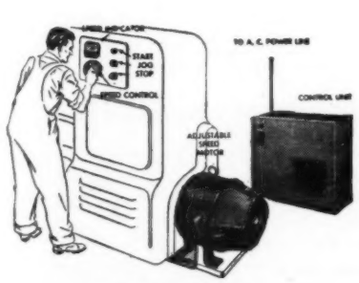
How we can help *you* meet the greatest challenge industry has ever faced

WAGES go up and up, along with other costs. Prices lag behind. Some relief may come from outside sources but, primarily, the problem of pushing production *up* and holding costs *down* must be solved by each individual company for itself. Here lies the greatest challenge industry has ever faced.

One sound answer is increased production through the use of more efficient machinery and methods. And this is where we feel confident we can help you. *We have yet to find the industry where Reliance V★S Drive cannot improve the quantity and quality of output, while lowering costs.*

A Reliance Application Engineer will survey your operations, then show you where and how you can benefit most through use of V★S—*the All-electric, Adjustable-speed Drive, operating from A-c. Circuits.* Just phone the nearest Reliance office or write us direct for Bulletin 311.

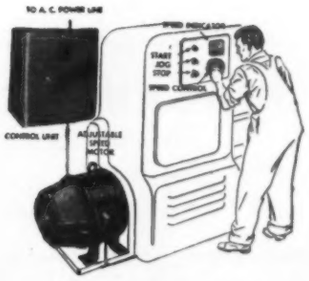
RELIANCE ELECTRIC & ENGINEERING CO.
1070 IVANHOE ROAD • CLEVELAND 10, OHIO
Branch Offices in Principal Cities



ROTATING SYSTEM
(1 to 200 hp.)

RELIANCE V★S DRIVE

Reliance V★S Drive provides unlimited flexibility of machine operation. Starting, stopping, speed changing, reversing, maintenance of proper tension and other controls are exercised automatically or manually from nearby or remote stations.

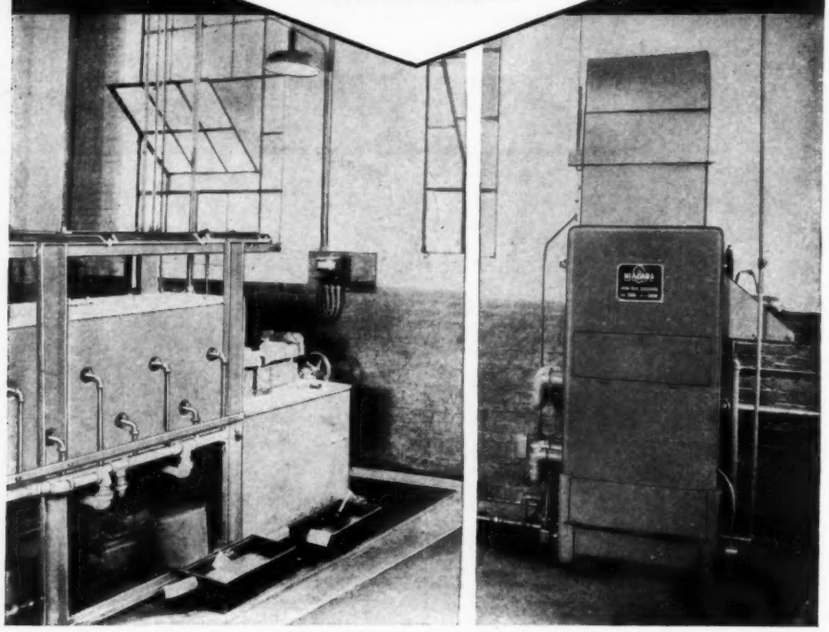


ELECTRONIC SYSTEM
(1 to 5 hp.)

RELIANCE A·C D·C MOTORS

"MOTOR DRIVE IS MORE THAN POWER"

IMPROVE HEAT TREATING QUALITY BY QUENCH TEMPERATURE CONTROL



● Improve the precision of your quenching to eliminate rejections and complaints. Accurate quenching bath temperature is secured by the patented "Balanced Wet Bulb Control" of the NIAGARA Aero Heat Exchanger.

The NIAGARA Aero Heat Exchanger is equally effective in both furnace heat treating and induction hardening systems. It prevents both over-heating and over-cooling of quenching baths. The flash-point hazard of oil baths is eliminated.

The NIAGARA Aero Heat Exchanger is self-contained, saving space; it replaces both shell-and-tube cooler and cooling tower; uses less power; operates with 95% less water consumption—an economy which pays for the equipment in a short time.

For further information write for Bulletin 96.

NIAGARA BLOWER COMPANY

"Over 30 Years of Service in Air Engineering"

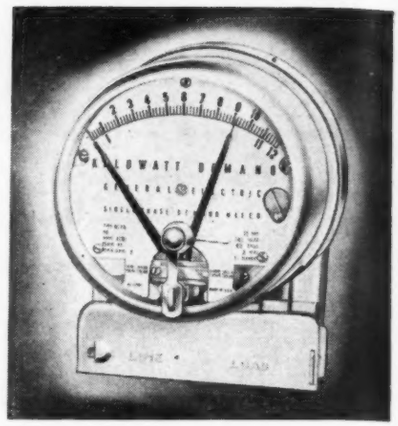
DEPT. F-56, 6 E. 45th St. NEW YORK 17, N. Y.

Field Engineering Offices in Principal Cities

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

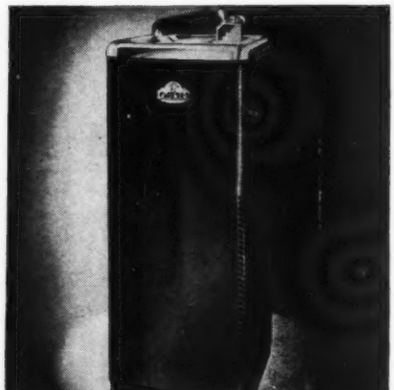
HUMIDIFYING • AIR ENGINEERING EQUIPMENT



permitting larger and sturdier parts, while minimizing need for maintenance. Maximum demand is indicated by a black pointer, pushed up-scale by the red pointer. The meter is housed in a glass case, coated on the inside except for the circular front opening, to promote uniform heat distribution within the meter and to aid in reducing effects of variable external temperatures. Scale has manually operated reset device, and conforms to standards approved by joint committee of EEI and AEIC. General Electric Co., Schenectady 5.

WATER COOLER

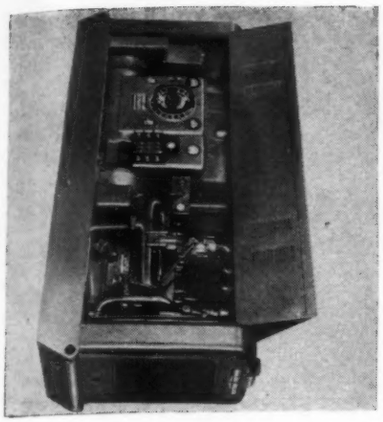
Oasis electric water cooler, a self-contained unit with a capacity of 10 g.p.h., is said to be adequate to serve 120 people per hour. Of all-steel construction, cooler, which has



outlet for remote bubbler, is 43½x15½x15½ inches, and operates from 110-volt, 60-cycle a.c. Ebco Mfg. Co., Columbus, Ohio.

ARC WELDER-GENERATOR

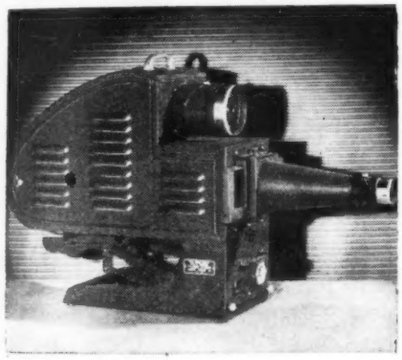
In-built auxiliary a.c. generator of 300-amp. gasoline-driven arc welder furnishes the following combinations of 60-cycle power simultaneously: 110 volts, single-phase; 110/220 volts, single-phase, 3-wire; 220 volts, single-phase; and 220 volts, three-phase. Oversized separate exciter is used for both the welding generator and the auxiliary a.c. generator. The panel provides receptacles and studs for connecting to power supply an a.c. voltmeter with dual scale, frequency meter, and rheostat for controlling the a.c. voltage. Auxiliary



a.c. generator is available in 6- and 12-kw. sizes. The Hobart Bros. Co., Hobart Square, Troy, Ohio.

FILM PROJECTOR

Model OA2 projector handles opaque objects, and transparent material up to 6¼x6¼ inches, and has an adapter for 35-mm. film and 2x2-in. slides. Lever adjusts projector and lens to requirements for different materials. Unit is designed to pro-

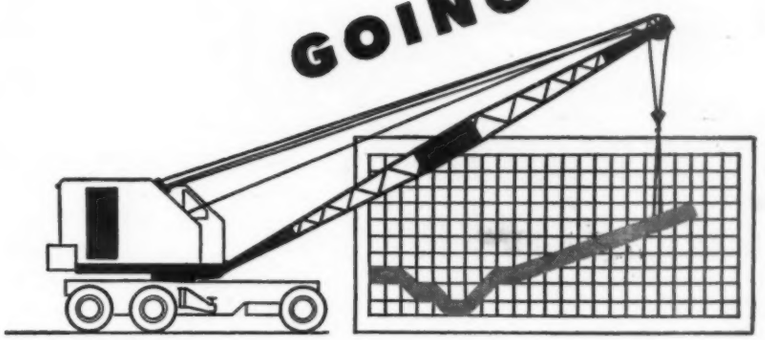


ject true colors of book pages, pamphlets, photographs, letters, advertisements, and clippings, as well as slides and films. Contains doors for servicing; concealed elevating legs; two postcard holders and double slide carriers; and two carrying handles. Charles Beseler Co., 243 East 23rd St., New York 10.

GRINDER

Capacitor-type motor powers the 6-in. No. 62 grinder, which, according to the manufacturer, will not burn out even though

PRODUCTION GOING UP!



WITH OSGOOD MOBILCRANES ON THE JOB!

Materials handling, one of the most important factors in production, is the key to increased production and lower costs. A designed-to-the-job **OSGOOD MOBILCRANE** that's compact and maneuverable can lift, move and place the heaviest of materials quickly, efficiently, economically . . . assuring maximum output from both men and machines.

One man operation through simple, positive-acting controls means fast, precise and safe operation. One-engine powered for greater economy and minimum maintenance. The **MOBILCRANE** requires no special roadbed or driveway . . . it's designed for easy, speedy maneuvering even in the closest quarters.

See your **OSGOOD** distributor today, or write for complete details . . . learn how and why an **OSGOOD MOBILCRANE** can save time, money and manpower by providing efficient handling of heavy materials.

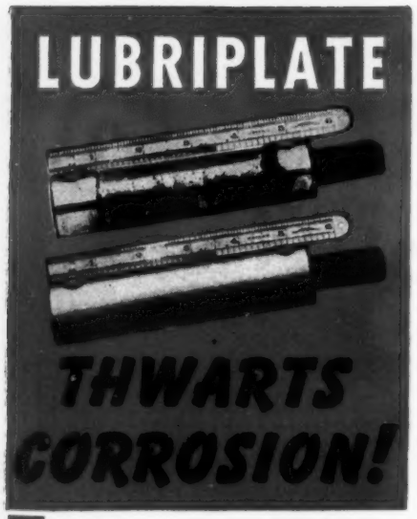
THE GENERAL EXCAVATOR COMPANY CRANES, DRAGLINES AND SHOVELS DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

OSGOOD CRANES-SHOVELS

THE OSGOOD COMPANY • MARION, OHIO

OSGOOD SHOVELS, DRAGLINES CRANES CRAWLER & WHEEL MOUNTED DIESEL, OIL, GAS, ELECTRIC



These originally identical shackle pins from a ten ton truck were used in a comparative lubrication test for a period of one year. A well known conventional lubricant was used on the upper pin. Note the pitting from corrosion, also the excessive wear. LUBRIPLATE was used on the lower pin. Its surface remained bright and true as when the test began, proof that LUBRIPLATE is different . . . better.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

LUBRIPLATE
FISKE BROTHERS REFINING CO.
NEWARK 5, N. J. TOLEDO 2, OHIO
DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

YOU CAN PREVENT RUST AND CORROSION

There is no need to dwell upon the ravages of rust and corrosion nor upon the tremendous tolls it takes every year from industry. We know it. The important thing is how to prevent it.

We also know that an unprotected ferrous metal surface if exposed to moisture will rust and that many non-ferrous metals will corrode in the presence of certain acids. The whole trick in preventing rust and corrosion is to keep the elements that cause rust and corrosion away from the metals.

In machinery it is often impossible or difficult to paint or enamel all metal parts that are subject to this form of damage. This is evident in the case of bearing surfaces and adjacent surfaces that are coated with oil or grease. Yet ordinary oils and greases do not offer complete protection against rust and corrosion.

It becomes obvious that when rust or corrosion regularly occurs, to prevent it a lubricant must be used that resists the conditions that cause it. That is one of the big reasons why LUBRIPLATE Lubricants are so widely used in all kinds of industries.

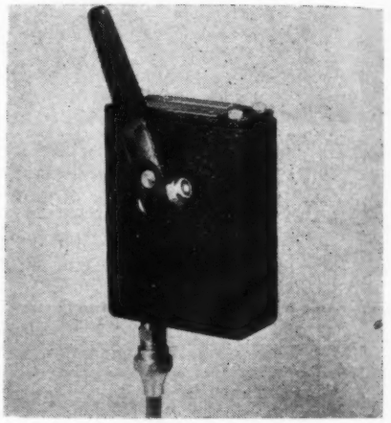
LUBRIPLATE is a tried and tested anti-rust and acid-resisting lubricant that can protect against the formation of rust and the destructive action of corrosion on bearings, gears, cams and other metal surfaces. And LUBRIPLATE lubricants provide superior lubrication as well. Possessing extra film strength, LUBRIPLATE lubricants keep metal surfaces apart, reduce heat and friction to a minimum, and arrest progressive wear.

A copy of "THE LUBRIPLATE SERVICE HANDBOOK" containing valuable information on the subject of lubrication will be furnished without charge by writing Fiske Brothers Refining Company, Newark 5, N. J. Adv.

repeatedly overloaded. Driven at 3440 r.p.m. by a ¼-hp. single-phase motor, machine has tapered end bells to provide wide clearance between wheels, which are ⅝-inch wide, and the motor frame. Removable guards permit wire or cotton brush to be used. Baldor Electric Co., 4351 Duncan Ave., St. Louis 10.

HYDRAULIC REMOTE CONTROL

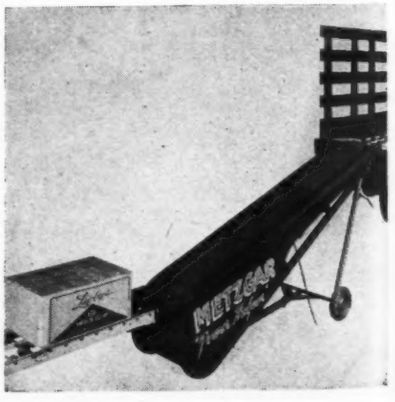
Claimed to be the smallest of its type and weight, hydraulic remote control can be used for throttle, mixture, governor, and position indicator control. Single flexible copper tube is used in the enclosed system. Transmitter and receiver, made of bronze,



together weigh 3.7 pounds. Either arm will move through an arc of 60 degrees, and receiver arm may be drilled at any location to obtain the desired linear travel of actuating rod. System is dust-proof and waterproof, and transmitter and receiver may be joined by as much as 35 feet of connecting tubing. Sperry Products, Inc., 1505 Willow Ave., Hoboken, N. J.

PORTABLE CONVEYOR

Power Helper portable conveyor features automatic tensioning of cleated or rubber belt and adjustable pitch from horizontal up to 45 degrees. Speed can be varied from 40 to 50 f.p.m. Conveyor has exposed belt surface of 6 feet, but length can be increased in multiples of 1 foot up to 10 feet. May be coupled with gravity roller or wheel conveyor for long runs or from floor to floor. Unit is suspended by



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BRONZE BARS

● Expensive delays in securing bearing bronze can, for the most part, be prevented. Simply call in your local Johnson Bronze Distributor. Permit him to show you how you can buy exactly according to your needs from our list of 350 stock sizes. Then let him prove to you the excellent service available from stock. There is a Johnson Distributor as near as your telephone.

When you install Johnson UNIVERSAL Bronze you are assured the utmost in performance and long bearing life. There is no higher quality bearing bronze available.

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in your phone book, classified section, for the name and number of your local Johnson Distributor.

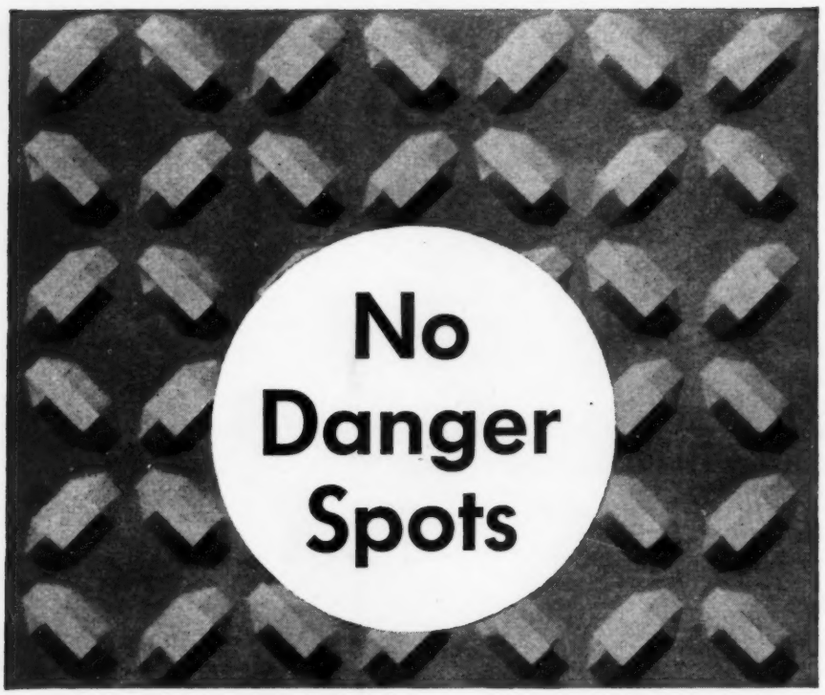
***Call** your local Johnson Bronze Distributor*

JOHNSON BRONZE

SLEEVE BEARING HEADQUARTERS

The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD

512 S. MILL STREET NEW CASTLE, PA.

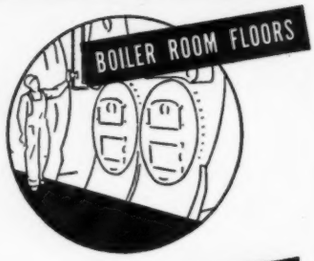


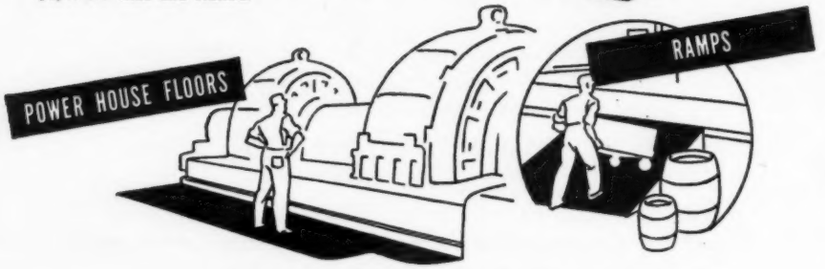
On small step plates and on factory floors, U·S·S Multigrip Floor Plate brings safe, sure footing to workers in all sorts of plants. Multigrip protects your workers from injuries due to skids, slips and falls, your floors from the wear and tear of plant traffic.

The scientific, patented design in which the flat-top risers are arranged insures resistance to slipping from all directions. Comfortable, too, for workers' feet, Multigrip Floor Plate reduces accident-causing fatigue. There are no pockets to accumulate dirt and grease, to hold water, to catch vehicle wheels.

Quickly and easily installed, U·S·S Multigrip Floor Plate adds structural strength, insures longer repair-free life for wood and concrete floors on which it is laid.

EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air.* American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.





U·S·S MULTIGRIP FLOOR PLATE

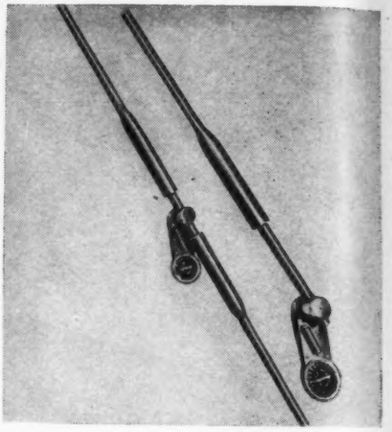
CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

heavy compression springs, and has ball-bearing, rubber-tired wheels. Steel covers enclose movable parts. Metzgar Co., Grand Rapids, Mich.

TORQUE METER

Equalized bolt tensioning is the function of "T-type" Torqometer now on the market. Tool, weighing 30 pounds, may be used with either single or double handle, and



records tension on an adjustable 4-in. dial. The 64-in. instrument has a capacity of 2000 foot-pounds. A flash signal lights when required tension is reached. Snap-on Tools Corp., Kenosha, Wis.

PIPE GAGE

Pocket-size pipe gage is calibrated to read size by which pipe is known to trade instead of by outside diameter, and indicates correct drill size for tapping. Meas-

uring 2¾ by 4½ inches when closed, the steel gage measures pipes and conduits, from ⅛- to 12-in. diameter, in any position. Three-Point Gage Co., 3767 North Racine Ave., Chicago 13.

TRANSFER VALVE

Manually or automatically operated 125-lb., single-vane control valve is used to transfer chemicals, oil, paper pulp, sewage, water, and other materials from one line to another. Made in all types of metals in sizes from 4 to 72 inches, it is available for a range of pressures together with

BAY STATE

NEW... *and improved Vitrified Bond*

by Bay State, **now combined with diamonds.**

"Nature's outstanding contribution to the abrasive world" joins Bay State's resinoid and metal bonds for diamonds.

Write for Bulletin 1980. Bay State Abrasive Products Company, 5 Union St., Westboro, Mass. ***Canadian Plant:*** **Brantford, Ontario.**

ABRASIVE PRODUCTS

Top Performance Consistently Duplicated

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS

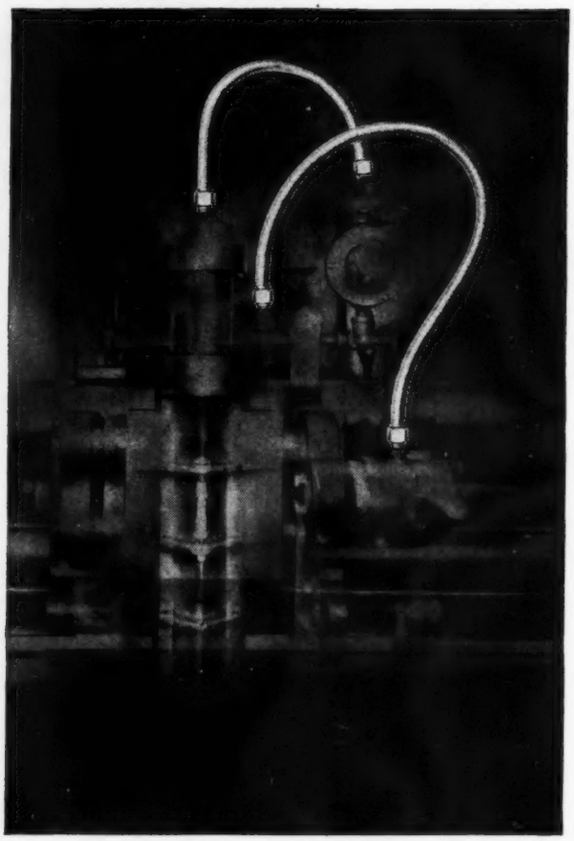
PRESSURE-TIGHT PERFORMANCE FOR YEARS at 475 Oscillations Per Minute

You're looking at Titeflex all-metal, flexible tubing serving a double purpose. First, as a hydraulic oil line supplying up to 75 pounds p.s.i. Second, as the exhaust return line.

Primary reason for the use of Titeflex in this out-of-the-ordinary installation is that its inherent pressure tightness—despite constant oscillation—prevents the line leakage that would mean impaired operating efficiency . . . work spoilage.

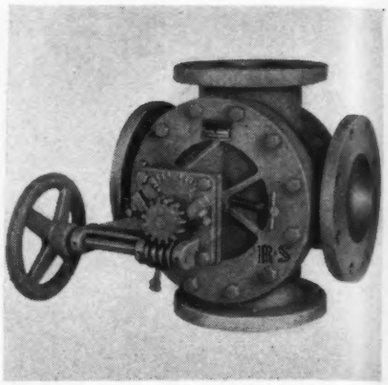
Titeflex likewise provides identical trouble-free protection and service while operating under constant vibration, pressure, heat, cold, or corrosive attack.

If you are not already aware of the economies and increased service performance that stem from Titeflex installations, our application engineers will gladly give you the facts. Titeflex, Inc., 505 Frelinghuysen Avenue, Newark, N. J.



Titeflex

THE ALL-METAL FLEXIBLE TUBING
THAT STAYS TIGHT



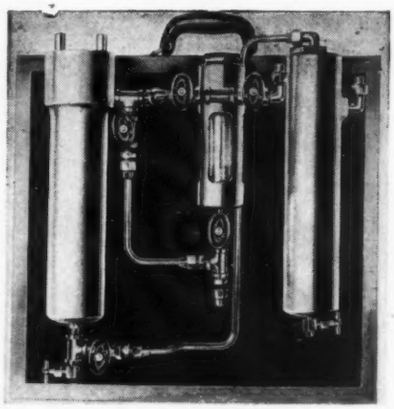
subzero and elevated temperatures. Constructed of "A"-metal, claimed to be a tough, dense metal of uniform grain and high endurance limit, to resist galling, "wire drawing," and the wearing action of abrasive materials, and to be of engineered construction to replace steel. R-S Products Corp., Wayne Junction, Philadelphia 44.

INTERCOMMUNICATION SYSTEMS

Line of Flexifone intercommunication equipment featuring a 10-station master, a 20-station master, a 6-station "Supervisor" master, and remote speaker station with or without call switch, has been developed. Housings are of die-cast metal, and set incorporates self-clearing piano type keyboard for station selector switches. Operadio Mfg. Co., St. Charles, Ill.

DEHYDRATOR

Portable D-10 dehydrator unit is said to have a moisture pick-up capacity of 50 grams of water while maintaining a dew point of 90 deg. F. below zero, and to be



capable of dehydrating compressed air lines with pressures up to 2000 p.s.i. Can be equipped with a dew-point color-change indicator. The Russell R. Gannon Co., Main & 5th Sts., Cincinnati.

AIR HOIST

Portable air hoist, weighing 30 pounds, has an over-all length of 14½ inches, and a minimum hook-to-hook dimension of 13½

STANDARDS and SPECIALS by the *Millions*

THE FERRY CAP & SET SCREW CO.

2167 SCRANTON ROAD • • • CLEVELAND 13, OHIO

"SHINYHEADS"
America's Best Looking Cap Screw

Made of high carbon steel—AISI C-1038—to standards for full finished hexagon head cap screws. Heads completely machined top and bottom. Hexagon faces clean cut, smooth and true, mirror finish. Carried in stock.

"HI-CARBS"
Heat Treated Black Satin Finish

Made of high carbon steel—AISI C-1038. Furnished with black satin finish due to heat treatment. Hexagon heads die-made, not machined. Point machine turned; flat and chamfered. Tensile strength 130,000-160,000 p.s.i. Carried in stock.

FILLISTER CAP SCREWS

Heads completely machined top and bottom. Milled slots—less burrs. Flat and chamfered machine point. Carried in stock.

FLAT HEAD CAP SCREWS

Heads completely machined top and bottom. Milled slots—less burrs. Flat and chamfered machine point. Carried in stock.

"SHINYLAND" STUDS

All studs made steam-tight on tap end unless otherwise specified, with flat and chamfered point. Nut end, oval point. Carried in stock.

SET SCREWS

Square head and headless—cup and oval point—case hardened. Carried in stock.

"SHINYTHREADS"
AIRCRAFT ENGINE STUDS

Made of highest aircraft quality alloy steel, finished to extremely close thread and body tolerance, with precision rolled threads—both straight and step types.

CONNECTING ROD BOLTS

Made of alloy steel—heat treated—threads rolled or cut—finished to extremely close thread and body tolerances—body ground where specified.

VALVE TAPPET ADJUSTING SCREWS

Hexagon head style—to blueprint specifications—hexagon head hard; polished if specified—threads soft to close tolerance.

SPRING BOLTS

Case hardened to proper depth and ground to close tolerances. Thread end annealed. Supplied in various head shapes, with oil holes and grooves of different kinds, and flats accurately milled.

STANDARDS carried by LEADING DISTRIBUTORS

SPECIALS furnished to BLUE PRINT SPECIFICATIONS

TO SAVE TIME AND COST
Simply Specify
"SHINYHEADS" NC or NF Thread
"HI-CARBS" NC or NF Thread

Pioneers and Recognized Specialists, Cold Upset Screw Products since 1907

WRITE FOR INFORMATION • SEND FOR SAMPLES •

Hein-Werner
HYDRAULIC JACKS

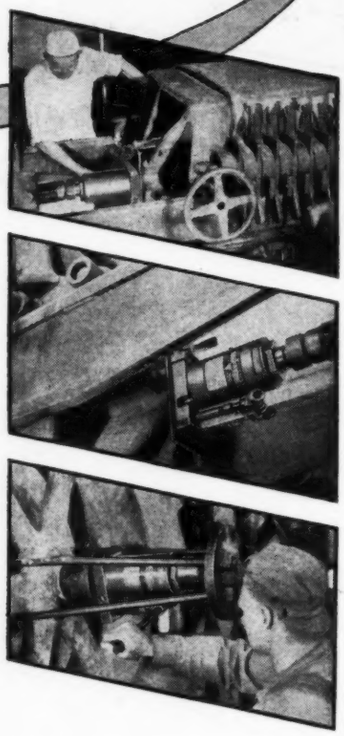
★ lift heavy loads

★ move machinery

★ bend rods

★ press bushings

★ have many other uses



30 TON MODEL

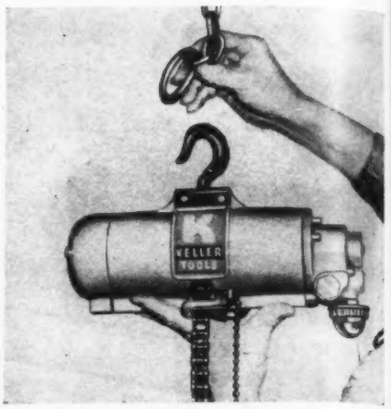
One doesn't have to be a super-man or an acrobat in order to lift or move heavy loads in an industrial plant.

Many jobs can be handled quickly, easily and safely with the aid of one or more Hein-Werner Hydraulic Jacks. Actual photographs reproduced above show a few of the wide variety of jobs which can be handled by one of these versatile performers.

These super-powerful, easy-operating, absolutely dependable jacks are made in models of 3, 5, 8, 12, 20, 30 and 50 tons capacity.

For details, consult your nearest industrial supply distributor, or write us.

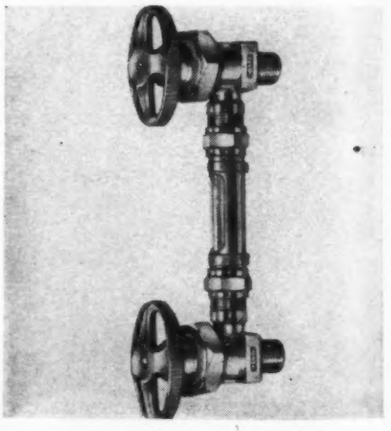
HEIN-WERNER MOTOR PARTS CORP.
WAUKESHA, WISCONSIN



inches. The design embodies a one-piece cast-aluminum housing, a mechanical brake independent of air supply, safety limit stops preventing operation beyond a safe working position, suspension and load hooks mounted on ball-bearing swivels, and variable speed control which facilitates positioning the load. It is said to use a minimum of air. Rated speed is 17 f.p.m. with full load, and 30 f.p.m. with no load. Available in 500- and 1000-lb. capacity sizes. Keller Tool Co., Grand Haven, Mich.

VALVE GAGE SET

Gage glass set with diaphragm packless valves is suitable for installation on accumulators, liquid receivers, oil reservoirs, and installations where there is surging or splashing within the vessel. Safety ball check in each valve prevents liquid from escaping and maintains pressure if

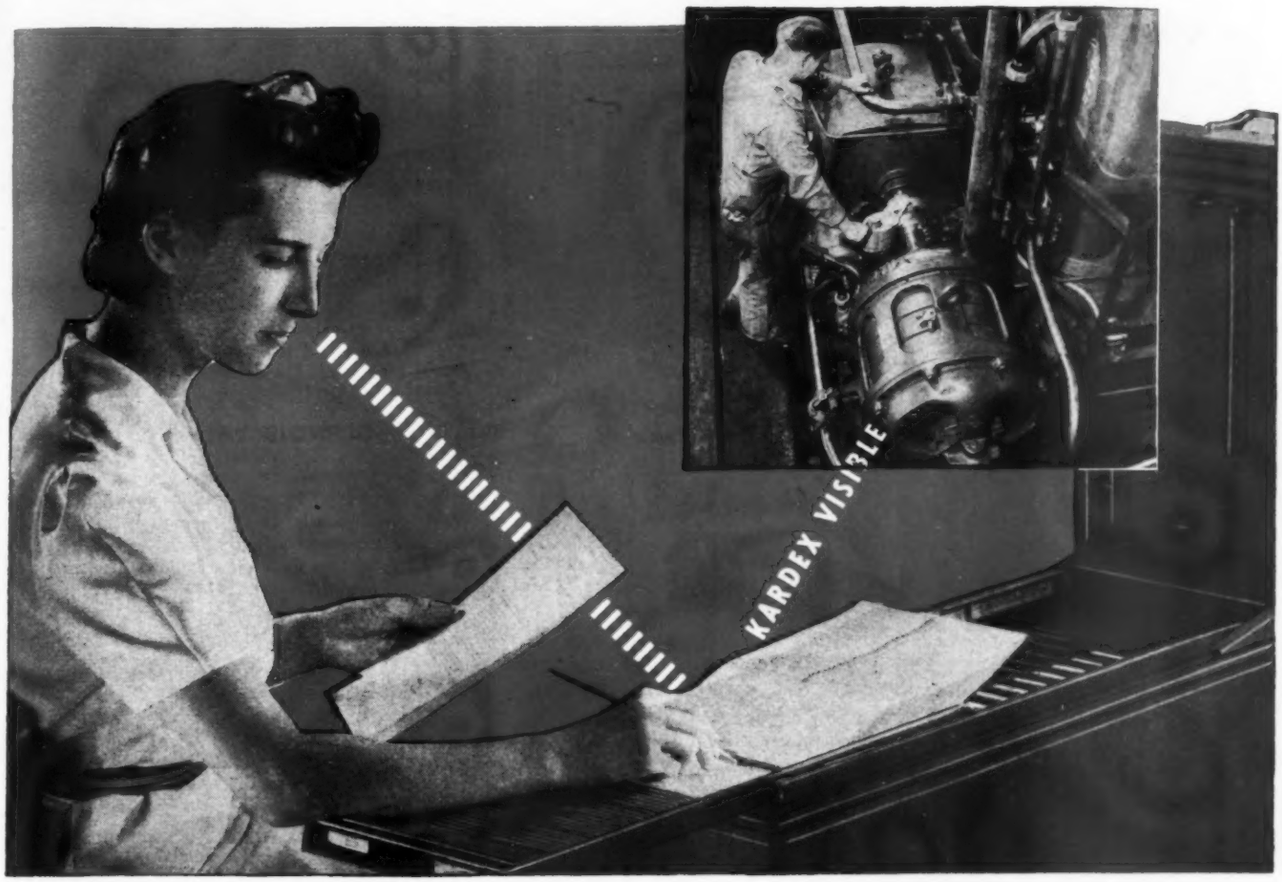


gage breaks. Slotted metal guard protects the tubing while providing a clear view of the liquid column. Tubing is rated at 500 p.s.i. (cold) for lengths up to 10 inches; 420 p.s.i., 11-20 inches; and 340 p.s.i., 21-24 inches. Standard valve has outlets on 15-in. centers, and 10 inches of exposed tubing. Henry Valve Co., 3260 West Grand Ave., Chicago 51.

HEAVY-DUTY RELAYS

No. 130 relays are for heavy-duty industrial and electronic uses, such as light contactor duty, control of single-phase motors, and other remote or automatic control purposes. They incorporate molded phenolic bases, accessible front-connected terminals,

Keep motors running SWEET so production won't go SOUR



NORDBERG lowers Maintenance Costs with KARDEX VISIBLE Control

With a simple Kardex Motor Maintenance Record Control, the Nordberg Manufacturing Company of Milwaukee licked 5 problems that bedevil plant operations and gum up profit pictures.

Here's how they correct troubles which may be bothering you too!

1. *Avoidance of motor breakdown and reduction of major repairs.* Kardex SIGNALS the next date for inspection or preventive maintenance on each motor.
2. *Efficient rotation of inspections and tests on the basis of experience.* Kardex reveals comparative data for instantaneous reference.
3. *More efficient use of maintenance man-hours.* This is automatic because with Kardex their work can be scheduled a week in advance.
4. *The fixing of responsibility for motor wear.* Kardex reveals whether unnecessary failures are due to abuse by operators or to careless maintenance.
5. *Reduction of maintenance costs.* This followed when Kardex gave Nordberg (a) pre-scheduling of maintenance time, (b) less loss of machine time and (c) reduced maintenance cost through *preventive inspections.*

Says Carl Lau, Nordberg Chief Electrician, "This record, so simple to operate and maintain, will rapidly repay its cost in direct savings and indirectly will lead to very large economies by preventing interruptions in production."

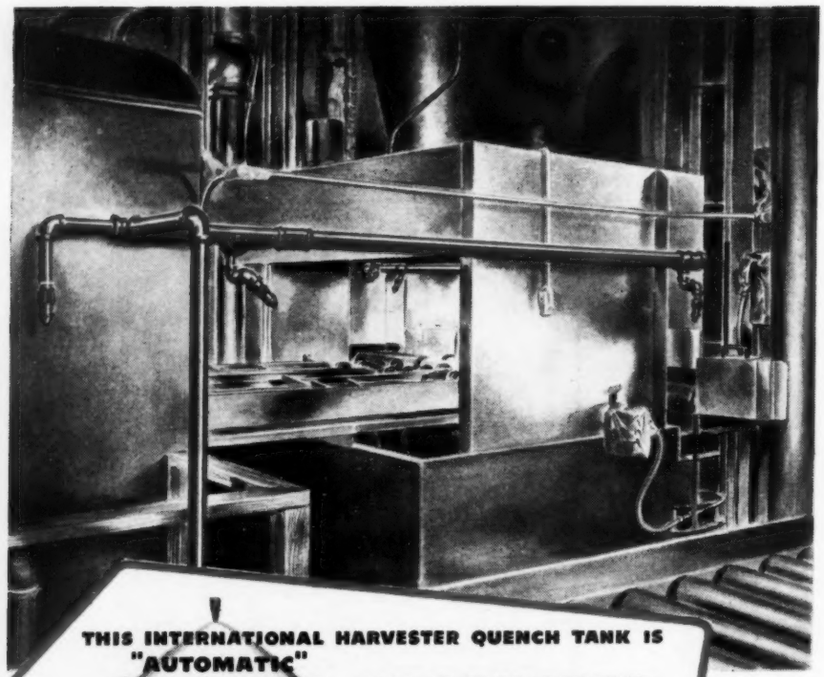
FOR DETAILS

Write to us for a copy of the January issue of "Systems", showing how this record works so well for Nordberg . . . and could for you! Or call our nearest Branch Office.

SYSTEMS DIVISION

Remington Rand

315 Fourth Avenue, New York 10, N. Y.



THIS INTERNATIONAL HARVESTER QUENCH TANK IS "AUTOMATIC"

FIRE-FOG PROTECTED

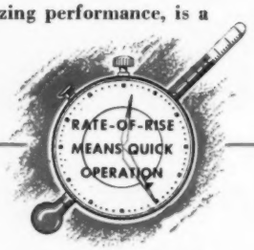
IT BLANKETS • IT ISOLATES • IT QUENCHES

...'nuf said!

Industrial America is rapidly becoming fire-hazard conscious. Obsolete and inadequate fire protection systems are being replaced by those systems which have clearly demonstrated their ability to protect.

"Automatic" FIRE-FOG, by virtue of its amazing performance, is a leader among modern fire protection systems. It quenches fires . . . even of flammable liquid origin. For example, when fire bursts forth at a FIRE-FOG protected oil quench tank, action is *automatic, decisive.* Instantly, the flames are beaten down . . . and seconds later, a would-be ruinous blaze is extinct. Within a matter of minutes production has been resumed.

"Automatic" FIRE-FOG is a proven safeguard for many types of serious fire hazards, ideal protection for oil filled electrical equipment, gasoline loading racks, enamel dip tanks and similar hazards. Write for complete information. It's yours for the asking.



THE SUPROTEX* SPRINKLER SYSTEM

A famous member of the "Automatic" Sprinkler Family. Designed particularly for use in manufacturing, mercantiles, warehouses, churches, schools, offices, hospitals, piers and other establishments where positive fire protection is a must.

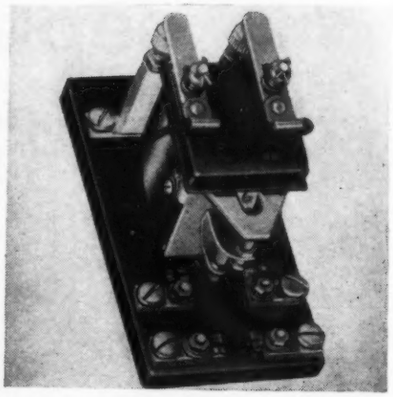
*Trademark Registered U. S. Patent Office

"Automatic" Sprinkler

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

YOUNGSTOWN, OHIO . . . . . OFFICES IN 36 CITIES

"Automatic" Sprinkler manufactures and installs a complete line of fire protection devices and systems for all types of fire hazards. Listed by Underwriters' Laboratories, Inc., and approved by Factory Mutual Laboratories.



corrosion-resistant finishes on metal parts, silver-to-silver contacts, and mechanical interlocks for reversing service, as well as mechanical latches for manual or electrical reset. Operating voltages for d.c. are 6-230 volts, and for a.c. from 6-440 volts. Ward Leonard Electric Co., Mt. Vernon, N. Y.

SOLENOID VALVE

Three-way, two-position solenoid valve is designed for applications in which a small electrically controlled valve is required to perform efficiently with a minimum of maintenance. Operated under pressures up to 150 p.s.i. May be used with water,

alcohol, hydraulic fluids, air, and other media—a.c. or d.c. operation, and for intermittent or continuous duty. Weighs 1 pound. Construction features stainless steel for all parts in contact with fluid handled; coil impregnated to withstand moisture; and welded stems. Allied Control Valve Co., Inc., South Norwalk, Conn.

BACK ON THE MARKET

GROUP WASH FOUNTAINS

From eight to ten persons can wash at one time at wash fountains which are back on the market. Units are said to save time, space, and installation costs. Enameled iron and stainless steel bowls are made in roll-rim or deep apron design. Removable panels provide access to interior mechanisms. Fountains are available in 54- and 36-in.-dia. sizes; circular or semi-circular; hand or foot controlled, and in types to suit different plumbing conditions. Bradley Washfountain Co., North 22nd and West Michigan Sts., Milwaukee 1.

"The R. K. LeBlond Machine Tool Company has what we believe to be the finest, most aggressive Agents in the machine tool field. No one has a better touch on the pulse of business in his locality. To get a poll of the prospects for the coming months, I'm about to launch a telephone survey among our LeBlond family.

"Long Distance? I want to place person to person calls to the following people . . . . . ."

B. N. BROCKMAN (Brock)
V. P. & Sales Manager

L. H. Roemer
LeBlond
New York, N. Y.

D. E. Whitacre
LeBlond
Chicago, Ill.

Frank Barber
F. F. Barber Mach. Co.
Toronto, Ont.

Russell Niemeier
Barney Mach. Co.
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is voiceless, visible signal dialing. It is the only intercommunication control that **prohibits conversation.** It gets work progress **reports to management the instant work is completed,** direct from employees working with and for management. It keeps the finger of management on the pulse of production. It reduces the size of any plant to startling compactness. It creates a faster moving, harder hitting organization. It gets action without barking orders. It's new, and streamlined. It puts your house in order—to meet delayed reconversion problems.

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"TEMPORATOR Centralized Industrial Plant Control" describes how "something that got lost" may be restored. It is free to plant, production, general managers, officials and executives who write on company letterheads to Simplex Time Recorder Co., Temporator Division, 68 Lincoln St., Gardner, Mass.

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more about the items on this page

Letters to the addresses given will bring information.

INTERVAL TIMER counts in 100,000ths of a second, in conjunction with photo-electric cell. Western Cartridge Co., East Alton, Ill.

TIME AND MOTION STUDY is aided by use of novel slide rule for computations. Reverse side lists 40 principles of motion economy as "reminders." $1.25. Better Methods Co., 1172 Raymond Blvd., Newark 2, N. J.

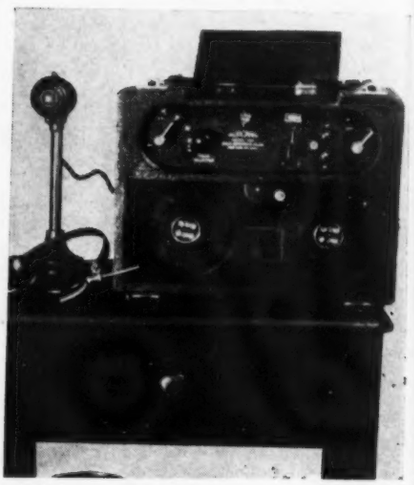
CALCULATOR in slide rule form simplifies figuring weights and measures, thermometric and formula conversions. $1. Slyd-Rule Co., 144-44 Sanford Ave., Flushing, N. Y.

SLIDE RULE calculates proper feed per tooth per revolution for all types of carbide milling cutters. Wendt-Sonis Co., Hannibal, Mo.

INDUSTRIAL FREQUENCIES CHART emphasizes spectra from 60 cycles power through the germicidal and X-ray frequencies. Free on request. Sherman Industrial Electronics Co., 503 Washington Ave., Belleville 9, N. J.

FABRIC made from Pliofilm thread is said to be washable, waterproof, scar-proof, and so tough that it cannot be scratched by knife. Upholstering uses are suggested. Chemical Products Division, Goodyear Tire & Rubber Co., Akron.

TO INFORM EMPLOYEES of major world events, new publication called *World Progress* has unusual format. Printed in several colors, size 45 by 35 inches, it resembles *Newsmap* published by U. S. War Department. For posting on walls. Progress, Inc., 727 19th St., N.W., Washington, D. C.

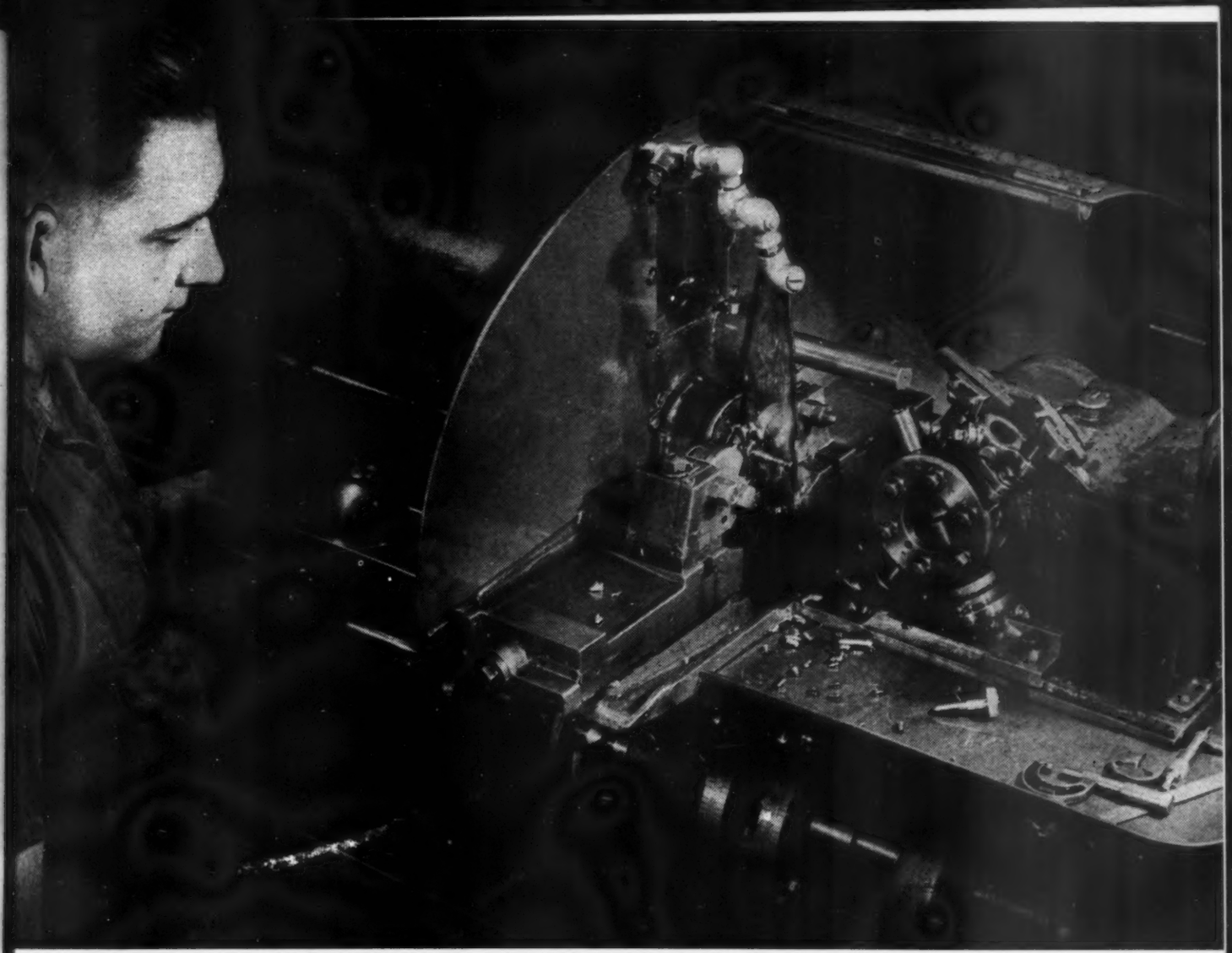


VOICE RECORDER for office dictation puts sound on rolls of film, for transcription, and provides play-back feature. Miles Reproducer Co., Inc. 812 Broadway, New York 3.

TRAINING WITHIN INDUSTRY is promoted by research organization. Details in folder. Training Within Industry Foundation, Room 515 Bassett Bldg., 382 Springfield Ave., Summit, N. J.

EXPIRED PATENTS are shown in text

FACSIMILE TELEGRAPHING communication instrument permits sending copies of original drawings or photographs as well as word messages—suitable for interoffice or branch plant communications systems. Is claimed to be able to handle 15 square inches of copy per minute. Finch Telecommunications, Inc., 10 East 40th St., New York 16



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Increases Production from 75 to 380 Pieces per Grind

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This is a typical example of the way in which Sun Engineers lend a helping hand to the manufacturer who is striving for production . . . precision . . . and profits.

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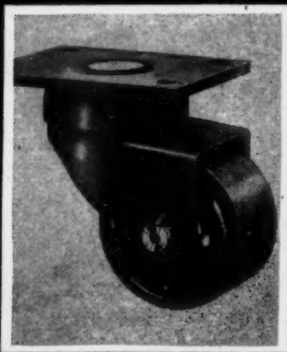

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DARNELL CASTERS

and drawings in weekly publication, *Public Domain*. Will list about 50,000 items per year. Annual subscription $45. Scientific Development Corp., 614 West 49th St., New York 19.

MIRROR-BRIGHT chromate film for zinc or cadmium plated parts is produced by 5-sec. immersion in Iridite Bright chemical. Rheem Research Products, Inc., 1409 Standard Oil Bldg., Baltimore 2.

WINDOW SCREENING protection against malaria and yellow fever mosquitoes will be adequate using 18x14 mesh, in lieu of pre-war 16x16 style, according to Insect Wire Screening Bureau, 74 Trinity Place, New York 6.

BUYING SURPLUS MACHINE TOOLS is explained in booklet with numerous suggestions to aid purchasers. National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6.

ELECTRONIC GRILL serves hot sandwiches when coin is dropped in slot. Pre-cooked foods are heated by high frequency radio waves. Automatic Canteen Co. of America, Merchandise Mart, Chicago 54

TO PREPARE METAL SURFACES for painting in one operation is "Minit Kote," a phosphoric acid emulsion having high detergency properties. Klem Chemical Works, 14401 Lanson Ave., Dearborn, Mich.

ENGINEERS FROM GREECE want to study American industry methods. About 60 young engineers are listed seeking places in American plants for six months or two years. All speak English. L. A. Marshall, Deputy Director, Industrial Rehabilitation, 4 Churchill St., Athens, Greece.

MANAGEMENT COURSE from June 10 to 28, in production planning, plant layout, motion and time study, wage incentives, and related subjects. Address Ralph M. Barnes, Director, State University of Iowa, Iowa City.

TEXTILE TREATMENT is claimed to give fabrics a permanent "starchiness" under all weather conditions. Process is called

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WAGE-HOUR RECORDS-

from each employee

There is nothing for the employee to do but insert and remove his card. The recorder automatically prints the time in the proper place. The card shown is one of many types available.

With IBM Attendance Recorders, plants large and small have found that these unquestionably accurate machines quickly pay for themselves in definite savings. Each employee becomes his own timekeeper, supplying an authoritative record of the actual time worked.

Electric Punched Card Accounting Machines and Electromatic Typewriters are additional aids in swift, accurate payroll accounting.

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HOURS 43		AMOUNT 42.26	STATE U.C.	BALANCE DUE 34.49
		TAX EXEMPT.	BONDS 3.75	
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	1st DAY	2nd DAY	3rd DAY	4th DAY	5th DAY	6th DAY	7th DAY	
16								
15					FR 20 30			
14					FR 17 33			
13								
12	Σ 17 01	⊇ 17 00		⊼ 17 03	FR 17 04			
11			⊇ 16 59					
10								
9								
8								
7		⊇ 12 59	⊇ 12 58	⊼ 12 58	FR 13 00			
6		⊇ 12 00	⊇ 12 01	⊼ 12 04	FR 12 02			
5	Σ 11 58							
4	Σ 11 00							
3								
2		⊇ 8 01						
1	Σ 8 00		⊇ 8 00	⊼ 7 59	FR 7 58			
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ARE WE WAKING UP TOO LATE?

One of the facts of life we sometimes forget is the need for production.

We can't sell what we don't produce, to anybody at any price.

Labor, without production, cannot prosper, regardless of wage rates.

Management, without production, will have nothing to manage except liquidation.

Capital, without production, becomes merely money. And money is worth only what you can get for it.

Government, without production, cannot win a war or maintain a peace. Without production, government cannot even maintain itself.

Right now, we're all busy putting obstacles in the other fellow's road. Most of these obstacles are man-made. They're artificial—and useless.

Does anybody—labor, management, capital or government—have the right to be a dog in the manger?

We can agree, as easily as we can disagree, in all these arguments that are holding up production.

Let's wake up, before it is too late. Let's produce.

Geo. D. Trundle Jr.
President

This organization of over a hundred trained engineers has twenty-seven years of consulting management engineering experience. We invite you to write for more information, or to request a personal interview in your office.

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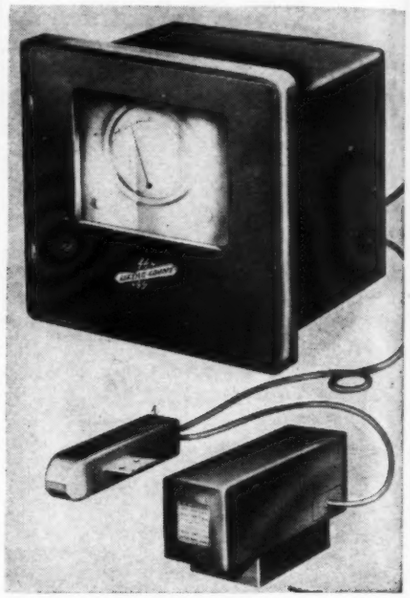
Kandarizing, developed by Naugatuck Chemical Division of United States Rubber Co., 1232 Sixth Ave., New York.

PROBLEMS OF NOISE are discussed in leaflet. National Noise Abatement Council, 9 Rockefeller Plaza, New York 20.



ELECTRONIC INSTRUMENT counts parts produced on any motor driven machine and makes tamper-proof record. Lansing Engineering Co., 934 Clark St., Lansing 6, Mich.

FUNGICIDE for textiles is suitable for mill application only. Treated fabrics buried 90 days retained full tensile strength. Compound is based on Copper 8-Quinolinolate and is affected little or none by water sprays, weathering, sunlight, and laundering. Free from objectionable odor, and compatible with water-repellent and fire-retardant finishes. Named "Milmer." Monsanto Chemical Co., St. Louis 4.

PLASTIC resistant to acids and high temperatures is to be called "Teflon." No substance has been found that will dissolve or swell this plastic and it is unharmed by temperatures from −75 to +572 deg. F. Uses include pipes for acids, engine gaskets, and heat-exposed electrical insulation. Now available for experiments only. E. I. Du Pont de Nemours & Co., Wilmington, Del.

LABOR LAW DIGEST covers state and federal legislation from August 1, 1944, to August 1, 1945. Small supply of copies available without charge. Large orders 20 cents per copy. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

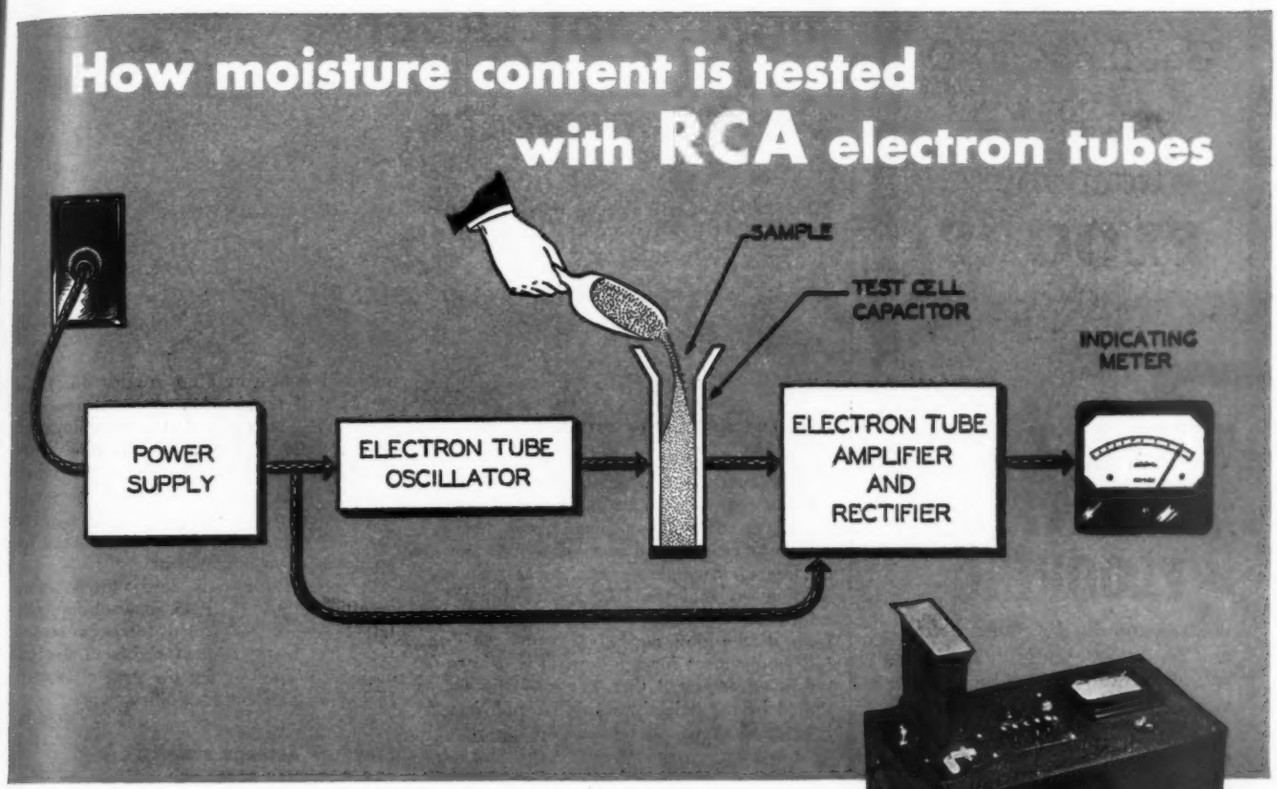
FILMS: Set of 13 discussional slide-films on the subject of the physical properties of fluids. Jam Handy Organization, 2821 E. Grand Blvd., Detroit.

Lessons in Grinding, a series of 16-mm. motion pictures in color. Norton Co., Worcester 6, Mass.

Educational films catalog includes complete list of government training films. Castle Films, Inc., 30 Rockefeller Plaza, New York 20.

Use of specially designed machinery shown in training film. Clark Equipment Co., Buchanan, Mich.

How moisture content is tested with RCA electron tubes



Electronic device, developed by Fred Stein Laboratories, determines moisture content within range of 2 to 35% in grain, seeds, dehydrated foods, cotton, and many other products.

SENSITIVE TO CHANGES OF .1%, the electronic moisture tester is used in hundreds of applications where it is necessary to know the percentage of moisture present in a product to be stored or processed. When the moisture content is found to vary from desired limits, corrective steps can be taken to save processing time, prevent spoilage, and improve storability.

The electronic moisture tester is being used to advantage as a precise means of controlling, through premeasurement, the moisture content of such varied products as foods, plastic molding compounds, smokeless gunpowder, resins, tobacco and coal.

How it Works: The electronic moisture tester operates on the principle that the "radio-frequency impedance" of a substance varies with its moisture content. This impedance can be measured with accuracy by placing a sample of the material between the plates of a capacitor, where it acts as a dielectric. The combination is therefore the electrical equivalent of a low-loss capacitor and a shunt resistor.

Power from a commercial 110-volt a-c supply is rectified, regulated and thereafter converted to a radio frequency of 3 megacycles, by means of RCA electron tubes. The radio frequency is applied to the plates of the test cell capacitor containing the sample. A sample of high moisture content offers a lower impedance to the flow of the radio-frequency current than a sample of low moisture content. The small voltage developed by this current is amplified and rectified by another RCA electron tube and registered on an indicating meter. Calibrated charts for various materials are supplied by the manufacturer to serve as standards against which the meter readings are checked and translated into percentages of moisture content.

Turn to Electronics for a Solution of Your Own Problems: For information on this moisture tester, write Fred Stein Laboratories, Atchison, Kansas.

Electron tubes are providing a practical solution to hundreds of manufacturing problems today. If you have not reviewed their possibilities as industrial tools, now is the time to consider their potentialities. The free booklet "16 Examples of RCA Electron Tubes at Work in Industry" will prove convincing. Write for your copy to: RCA, Commercial Engineering Department, Section I-12E, Harrison, N. J.

THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA

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RADIO CORPORATION of AMERICA

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is designed for fast, heavy, stop and go, traffic . . . It is the hardest, resilent floor produced, yet sufficiently resilent to absorb the shocks of heavily loaded steel wheel trucks . . Can be easily and economically installed by your own maintenance crew without seriously disrupting work . . and is a safe, odorless, damp proof surface. Consult with Tuffalt about your floor problem . . .

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Significant Labor Developments

BENJAMIN WERNE, Lecturer in Government Regulations, New York University. Member of the New York Bar

Period Surveyed: March 1 to April 1.

TREND INDICATORS

VETERANS SUBJECT TO DIVISION OF WORK CLAUSE

The existence of a contractual clause providing for division of available work among employees when insufficient work makes full employment of all impossible, was held binding upon employee-veterans as well as non-veteran employees. As construed by the arbitrator, the clause prevents the employer from discharging non-veterans to provide full employment for veterans. The arbitrator in effect stated that Congress did not intend by the Selective Training and Service Act to grant veterans an annual wage or steady employment for a full shift during every work day of the year following their reemployment. The Act was rather designed to accord veterans their full seniority rights as protected and enlarged by the Act and collective bargaining agreements, but not to accord them superseniority rights, whereby, at the expense of other workers such as non-veterans or veterans of World War I, they would have continuous full employment or an annual wage based on regular employment. (In re Arbitration between Mode O'Day Corporation and International Ladies' Garment Workers Union.)

VETERANS' REEMPLOYMENT RIGHTS ARE SET FORTH

Selective Service headquarters recently set forth management's responsibilities in the case of reenlisted and newly enlisted veterans. The opinions set forth below are subject to the continued existence of the amended Selective Service Act of 1940 and may have to be changed as a result of subsequent legislation. The statutory provisions upon termination of enlistment or reenlistment will govern the rights of the veteran and the responsibilities of the employer.

Under present law, where the employee-veteran is unconditionally discharged from the armed forces and thereafter reenlists without either applying for or securing reinstatement in his old job within the required 90-day period, he has no reemployment rights. But where he is discharged for the specific purpose of immediately reenlisting, he has reemployment rights at the end of the reenlistment period, inasmuch as there has been no break in his military service.

Where the discharged serviceman reenlists after reinstatement in his former position, the employee-veteran has reemployment rights to his old position upon termination of his reenlistment period.

Whether the employee enlisted or was inducted before or after August 15, 1945, the date of termination of hostilities with Japan, he is entitled to reemployment rights. And if the employee was newly hired after August 15, 1945, and subsequently enlisted or was inducted, he would have similar reemployment rights. The date of August 15 has no significance for purposes of reemployment.

A veteran who was newly hired before or after August 15, 1945, and subsequently left to enter the armed forces a second time, has reemployment rights to the job he leaves. Here again, the date of August 15 has no particular significance.

LEAVE OF ABSENCE PERMITTED FOR RETURNED VETERAN

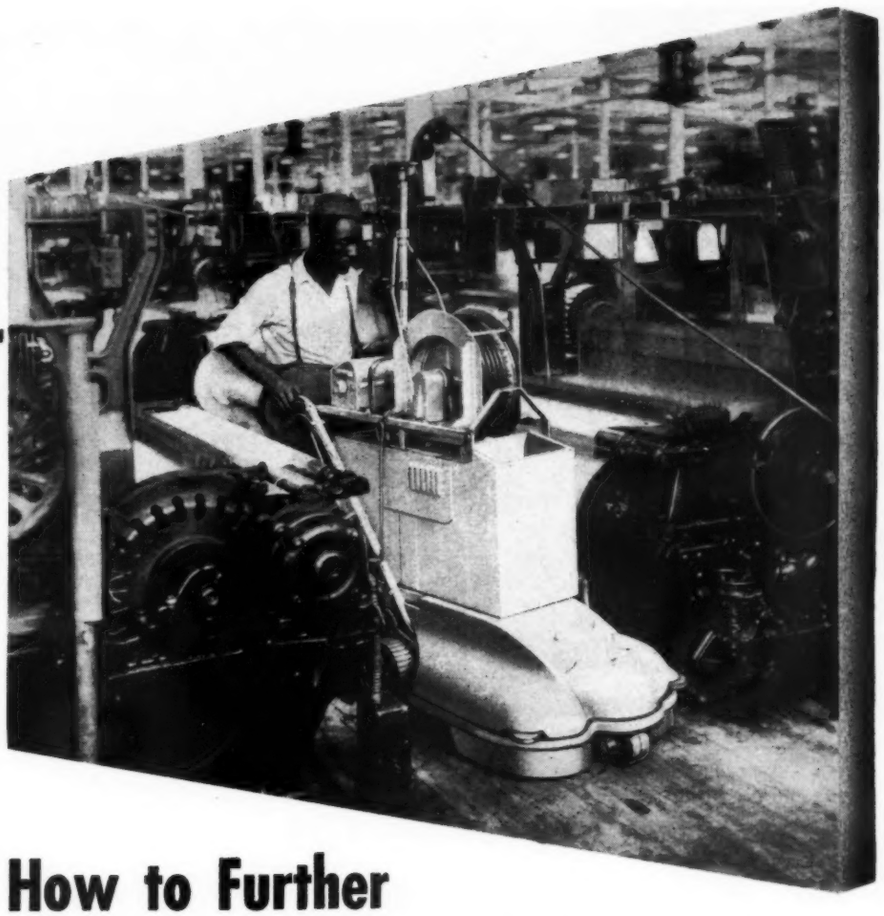
The fact that a veteran, acting upon the employer's and company physician's advice, sought a leave of absence upon returning to his former job, does not render his application untimely. Upon request for such leave, the employer did not refuse it, while the company physician erroneously declared the veteran physically unfit. When the veteran discovered the doctor's error, he sought reinstatement in his former job. The court, upholding the veteran's reinstatement rights, deemed the company responsible for denying the veteran his statutory rights in refusing to reinstate him. (Grasso vs. Crowhurst, CCA-3.)

SUPERSENIORITY DENIED VETERAN

Reversing a lower court's holding, a circuit court of appeals denied superseniority to a returned veteran. The veteran involved, after being reinstated, was laid off while other non-veteran workers with longer seniority records were retained, in accordance with the company's union contract which provided that a decrease in working force was to be based on length of service. The appellate court maintained that the Selective Service Act provision, "The employer shall restore such person to such position or to a position of like seniority, status, and pay," does not grant superseniority to the veteran, since his job is subject to the same conditions as his old job, including layoff. Layoff is not interpreted to be a discharge, which was prohibited by the Act for one year after the veteran's restoration to the job. (Fishgold vs. Sullivan Dry Dock & Repair Corporation, CCA-2.)

REINSTATEMENT OF DISCHARGED VETERAN ORDERED

Discharge of a veteran for violating a no-



How to Further The Economy of Machine-Scrubbing

Three-way savings are possible simply by choosing a cleanser that keeps pace with the speed of machine-scrubbing . . . *one that is specially compounded for the purpose.* Such a cleanser cuts the operating time of the machine to the minimum required, effecting savings in labor costs . . . prolongs the life of the machine . . . and saves on brushes. In contrast, slow-acting cleansers necessitate prolonged brush action, which not only needlessly piles up mileage on the machine but prematurely wears out the brushes.

All *Finnell* Cleaning Compounds are designed to work in scrubbing machines, and all are products of *Finnell's own powder mill.* There are six such cleansers, including *Setol,* the mineral oil solvent for use on mill and factory floors (it emulsifies grimy oil and grease *instantaneously*) . . . and *Finola, the Original Scouring Powder,* for heavy duty scrubbing of smooth, hard surface floors. For consultation or literature on the full line of *Finnell* Cleansers, as well as on *Finnell* Scrubbing Machines, phone or write nearest *Finnell* branch or Finnell System, Inc., 2505 East Street, Elkhart, Indiana. Canadian Office: Ottawa, Ontario.

FINNELL SYSTEM, INC.

Pioneers and Specialists in

FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

We Created and Designed It, Not by Magic but by

engineering brains & experience

Rubber parts are just coming into their own and many a manufacturer confronted with a mechanical problem has found the solution in rubber parts created by Johnson engineers. That's a job our engineers are constantly doing and one they are well qualified to handle.

Years of experience has taught them how, when and where to put rubber parts to work advantageously. Experiments have proven over a period of years that in many instances rubber parts will outlast metal parts and operate more efficiently.

The solution to one of your product problems may be found in a newly designed rubber part. If "skill to do comes of doing" this explains the popularity of this fifty year old company in producing rubber parts for industry.

If you have a problem our engineers will be more than glad to work with your engineers, feel free to call on them at any time.

fighting rule was deemed inappropriate by an arbitrator. The returned veteran had started the fight with a non-veteran but had been provoked into it. Taking into consideration the veteran's mental condition resulting from his service in the armed forces, and the fact that the non-veteran had not been disciplined, the arbitrator ordered reinstatement but without back pay. (In re Arbitration between International Harvester Company and United Farm Equipment & Metal Workers of America.)

PROHIBITION AGAINST HOMEWORK CONTINUED

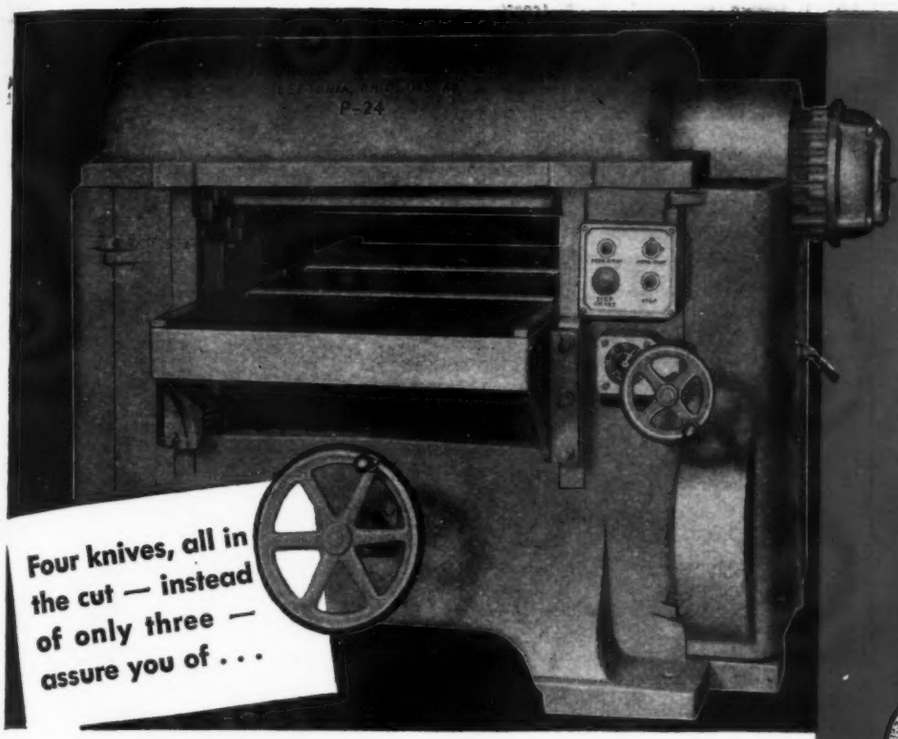
Despite the expiration of the wage order, a federal district court maintains that the prohibition against homework in the embroidery industry is still in effect. An employer contended before the court that, since there is no further statutory basis for the order, the prohibition lost effect. The 7-year limitation placed upon Administrator's orders, the employer stated, renders the prohibition ineffective when the order expires. The court, however, reasoned that the limitation applies only to a wage rate and not to all administrative rulings. Furthermore, the Administrator has the implied power to prohibit homework under the general terms of the Act. (Walling vs. Wolff, USDCE, N. Y.)

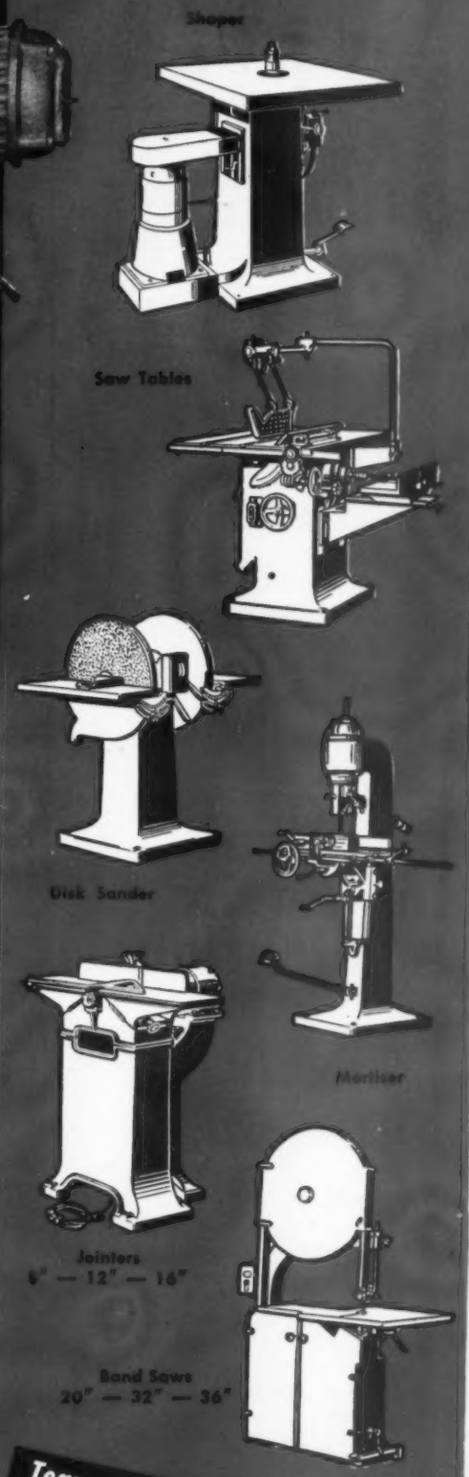
OVERTIME PAY

Employers may find themselves owing salaried employees back pay if during the war period they paid such employees extra amounts in lieu of overtime on the ground that the employees were exempt from the statutory requirement that time and one-half be paid for all hours worked in excess of 40 a week. If these workers are now found to be covered by the Wage-Hour Law, the difference between the amount paid the employee and the amount that would have been paid if computed at one and one-half times the base rate is due the employee. However, such payments made in lieu of overtime need not be included when computing the employee's regular rate of pay; and the aggregate of amounts so paid may be credited against overtime due.

FORTY HOURS OF WORK REQUIRED BEFORE OVERTIME IS DUE

Before overtime may be collected in keeping with the Wage-Hour Law the employee must have worked 40 hours in the work week established by the employer. The work week established need not be a period of any 7 consecutive days worked. By staggering the work week beginning on Wednesday so that the employee worked 7 consecutive days on each of three shifts but never worked more than 40 hours within the work week, since he never worked on Wednesday, the beginning of the work week, the employer avoided the payment of overtime. In upholding the employer, the court held that the Department of Labor's interpretation of the work week under the Premium Pay Order,—i.e. that a work week consist of 7 consecutive days begin-





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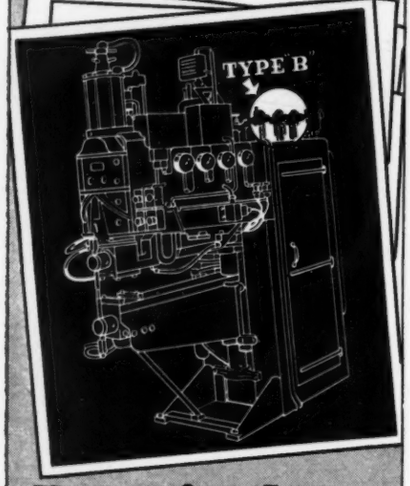

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ning on the same calendar day,—was binding for purposes of determining overtime due under the Wage-Hour Law. (Harned vs. Atlas Powder Company, Kentucky Court of Appeals.)

BELO DOCTRINE IS NOT ALWAYS APPLICABLE

A circuit court of appeals held the Belo doctrine inapplicable to a wage plan under which the regular rate of pay could not be ascertained until the employee's weekly pay was computed on a daily wage basis. The employer in this case computed the hourly compensation in such manner that straight time plus overtime equaled the total weekly compensation previously determined on a daily basis.

The employees received a fixed amount for a 9-hour day and six such 9-hour days constituted a work week. The employer, however, did not carry the weekly determined rate on his books, but rather "regular rates," which he did not use for computing overtime. Because of the fictitious nature of the rates, the court condemned the plan. It explained that the present plan lacked both the weekly wage guarantee and agreement on "regular rate," essential characteristics of the Belo plan. (Castle vs. Walling, CCA-5.)

DISCRETIONARY BONUS HELD PART OF "REGULAR RATE"

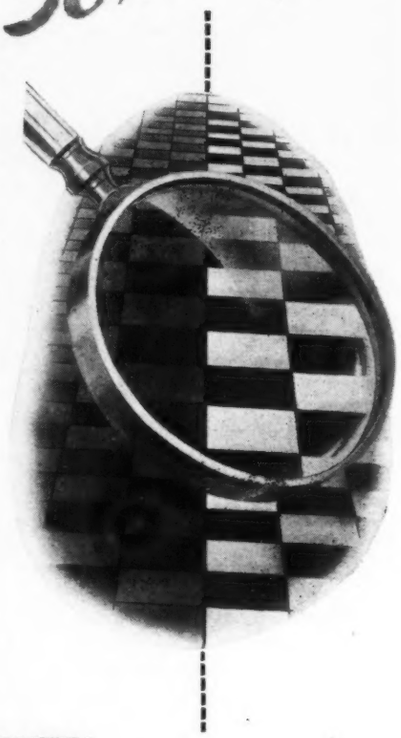
Inclusion of monthly bonuses paid in the form of war bonds and stamps in the "regular rate" was ordered by a circuit court of appeals, although the bonuses were discretionary, not contractual, and could be discontinued if the company's financial condition warranted it. In so deciding, the court pointed to the fact that, although the employees could not force the company to make such payments, they were regularly paid and the employees came to assume that they would receive them. In view of such circumstances, they were rightly part of the "regular rate" for overtime purposes. (Walling vs. Richmond Screw Anchor Co., Inc., CCA-2.)

EXEMPT STATUS OF EMPLOYEE NOT LOST THROUGH DISCIPLINARY DEDUCTIONS

The Wage-Hour Division has issued a ruling which will allow employers who have annual leave plans for their salaried employees to make deductions from salaries for unreasonable additional absences and which will not destroy the employee's "exempt" status.

For example, if a company's leave plan for executive, administrative, or professional employees provides for not less than 21 days' leave annually, with no unreasonable restrictions with respect to the reason such leave is taken, the employer may deduct from an employee's salary for additional absences. Any such deduction would constitute a disciplinary deduction for an unreasonable absence, and would not destroy the "exemption" of the employee. However, if the leave plan limits absences to 21 days per year and contains restrictions on the purposes of the leave, the Wage-

INSIDE FACTS on how to make floors stay clean up to 30% longer!



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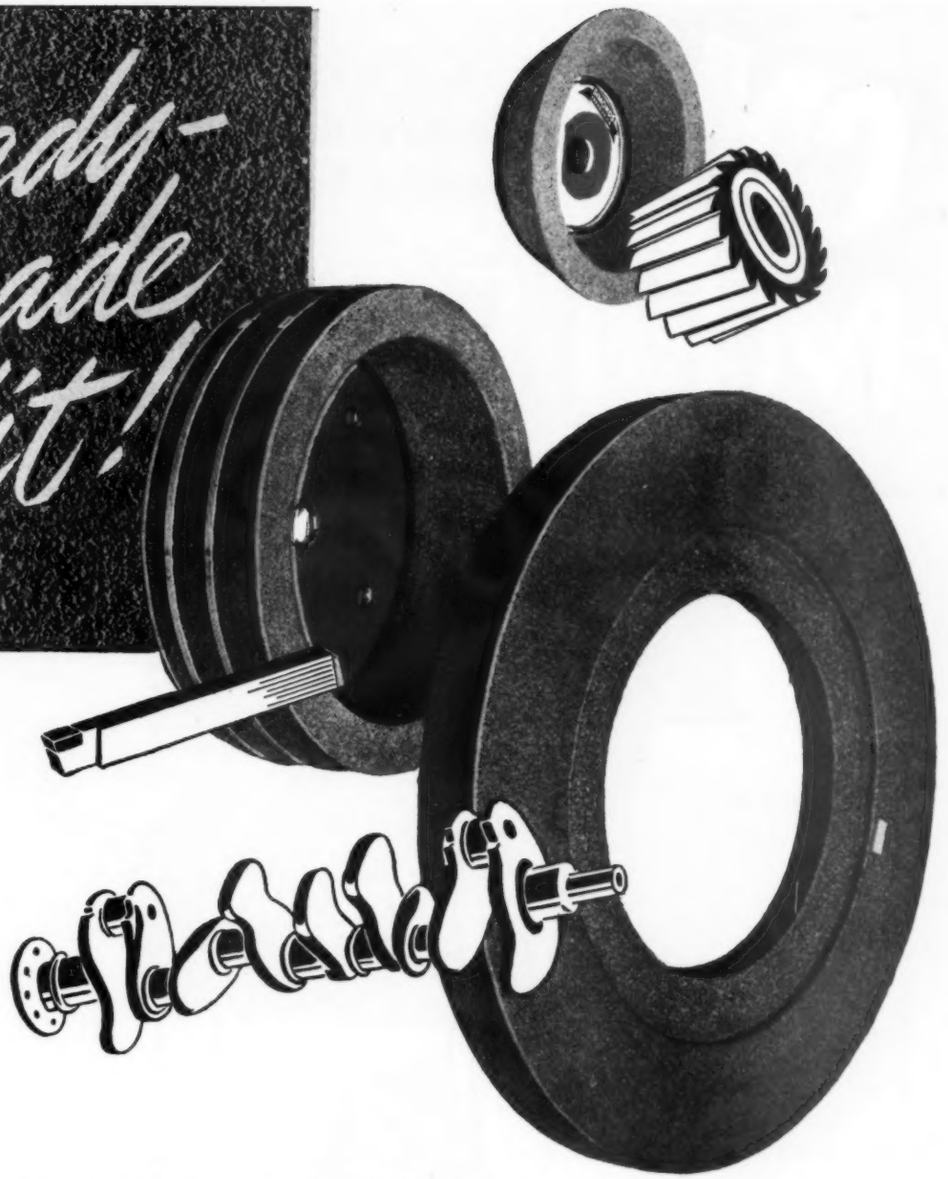

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Hour Division states that the plan should allow "at least seven days' sick leave, seven days' annual leave, and seven days' leave for personal or miscellaneous needs."

STATE STATUTE OF LIMITATIONS DEEMED UNCONSTITUTIONAL

The Iowa Statute of Limitations, placing a 6-month limit upon the time in which claims arising under federal laws including wage actions under the Wage-Hour law may be brought, was deemed unconstitutional by the U. S. Supreme Court. Without this statute of limitations, employees have ten years in which to bring claims that arise under contract and five years where no written contract exists. (Republic Pictures Corporation vs. Kappler, U. S. Supreme Court.)

"SLEEPING" TIME CANNOT BE FIGURED AS TIME WORKED

Time spent by firemen on an 8-hour "sleeping" shift of a 24-hour duty assignment was deemed non-compensable. The firemen spent 8 hours working, 8 on call, and 8 sleeping, and then were relieved of work for the next 24 hours. During the "sleeping" shift the employees were rarely interrupted. (Bower vs. Remington Rand, Inc., USDC S. Ill.)

HELD NOT EXEMPT

Mechanics of a service company maintaining, repairing, and servicing transportation equipment owned and operated by a drive-away concern which transports automobiles and army equipment in interstate commerce. The court declared that the service establishment exemption could not be applied in this case since the employees do not perform services for the "ultimate consumer." (Boutell & Boutell Service Company vs. Walling, U. S. Supreme Court.)

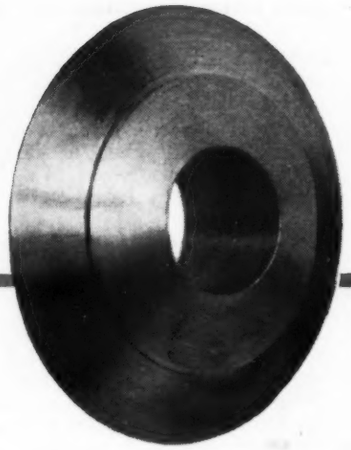
HELD UNDER THE ACT

Employees in a warehouse of a merchandising company doing business in all states, since they constantly handled both incoming and outgoing interstate shipments. (Aritis vs. Montgomery Ward & Company, Inc., USDC E. Mich.)

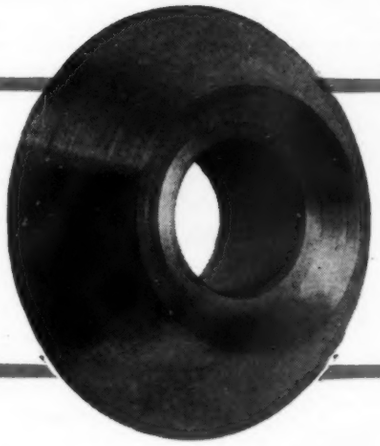
Employees engaged in a quarry to furnish rock to be used in constructing a dike to protect interstate oil wells from possible inundation, since their activity was an integral part of the interstate shipment of the oil. (E. C. Schroeder Company vs. Clifton, CCA-10.)

Employee performing bookkeeper and auditing functions in accounting department of New York construction contractor constructing a military base in Greenland, since his work was an essential part of the contractor's interstate business. Nor could he be considered exempt as an executive, since he performed routine clerical work and the chief accountant was head of the department. (Brand vs. McWilliams Dredging Company, USDC E. N. Y.)

Employees of a local laundry, 80 percent of whose facilities were devoted to the laundering of garments rented to com-



ASK YOUR PRODUCTION MAN



Would you like to know what parts like these *should* cost in large quantities, made by modern production methods?

They are Pinion Gear Blanks, $3\frac{1}{2}''$ in diameter, made from 9310 hot rolled steel bars. The $4\frac{3}{4}''$ four spindle Acme-Gridley Bar Automatic on which they are produced handles this tough steel at new high speeds, in spite of the heavy forming operation, and holds the reaming of the hole to very close tolerances.

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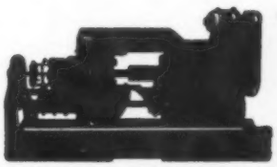
Such a comparison may give you a new idea of what Acme-Gridley 4, 6 and 8 spindle automatic production methods can do to reduce *your* costs on long runs of identical precision parts.



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mercial firms by a second laundry, 5 percent of whose business was in interstate commerce. The court declared the first laundry's employees were "necessary to the production of goods for commerce." (Phillips vs. Star Overall Dry Cleaning Laundry Company, Inc., U. S. Supreme Court.)

Contractor's employees handling the goods and supplies necessary to the construction of a highway. (Crabb vs. Welden, USDC, S. Iowa.)

Employees of a local sawmill whose products were sold to local companies to be resold in interstate commerce or to be used in the production of goods for interstate commerce. Since the employer knew that his goods were put to interstate use, the court declared that the determining factor sustaining coverage was that the sawmill's employees were "necessary to the production of goods for commerce." (Walling vs. Hammer, USDC, W. Va.)

HELD NOT UNDER THE ACT

Company's employees making cement used by contractors to repair and maintain highways, since the employees were not engaged in producing goods for interstate commerce (the highway once repaired remained in place), nor were they actually engaged in commerce (the cement was used by other employees). (Ramos vs. P. R. Cement Corporation, USDC P. R.)

PAYMENTS UNDER THE WALSH-HEALEY ACT

Payments due employees because of proceedings brought under the Walsh-Healey Act must be paid to the government for distribution to the employees and not held or paid directly to the employees by the employer. The Public Contracts Administrator denied one employer a reduction (in damages due) for the amounts he claimed were paid to the employees or were being held for veterans until their return. (D & D Shirt Company, Public Contracts Administrator.)

WAGE STABILIZATION BOARD

SSU APPROVAL NOT REQUIRED FOR CERTAN SALARY INCREASES

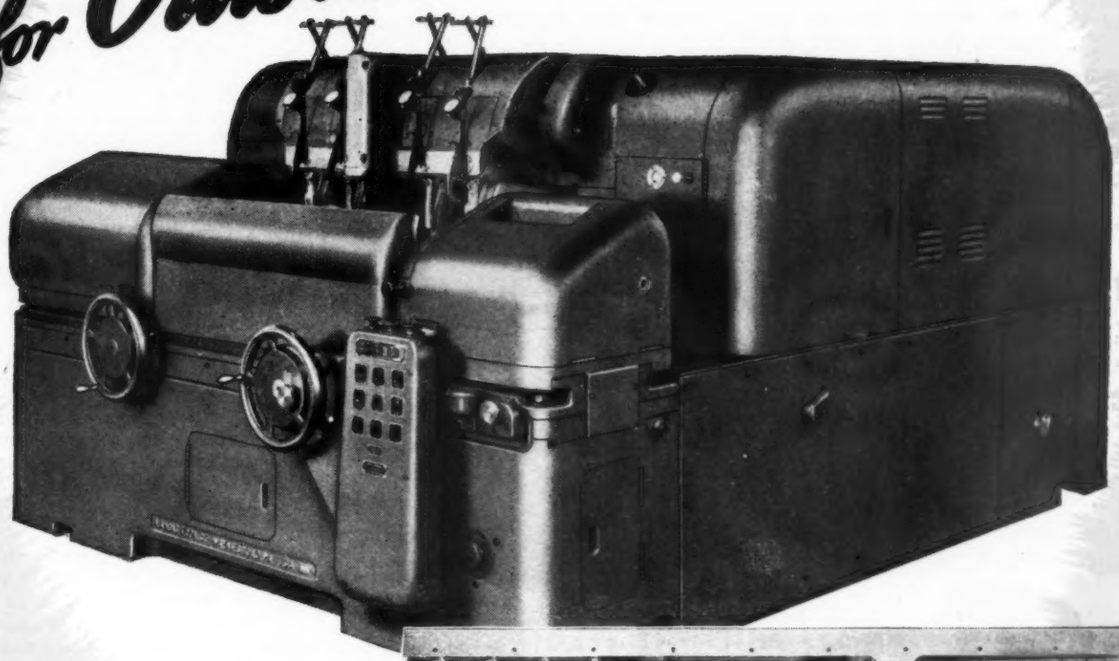
SSU approval is not required for salary increases not in excess of the increases granted hourly paid employees under a Wage Stabilization Board's pattern of preapproved order. However, such increases may not be granted to employees earning more than $7500 a year and any general salary increase put into effect since August 17, 1945, must be counted against any increase forthcoming under this new order.

*EXPLANATION OF NEW PRICE POLICY

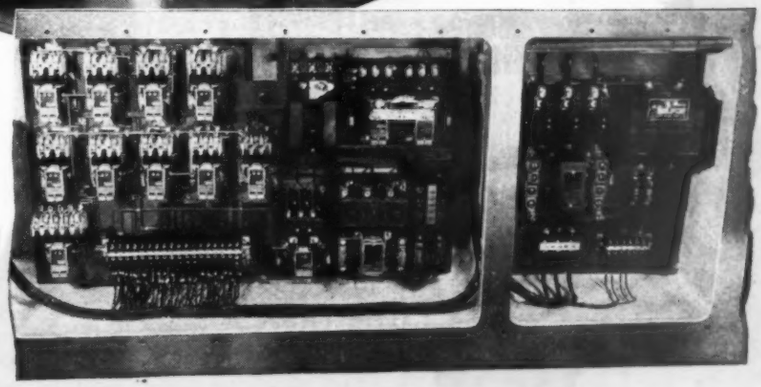
In interpreting the new wage-price policy, the Wage Stabilization Board has issued the following explanation:

* In this and the following classification items marked with an asterisk also are considered to be trend indicators.

Outstanding Control for Outstanding Machines



Built by LANDIS TOOL for the automotive industry, this 50,500 pound grinding machine provides the fastest known method of grinding crank shaft line bearings. Square D control (at right) puts this machine through its paces by "finger tip" operation.



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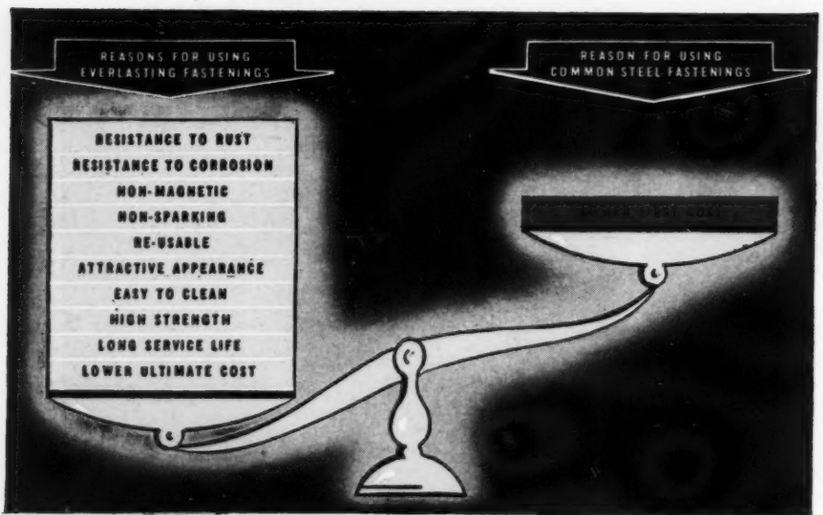

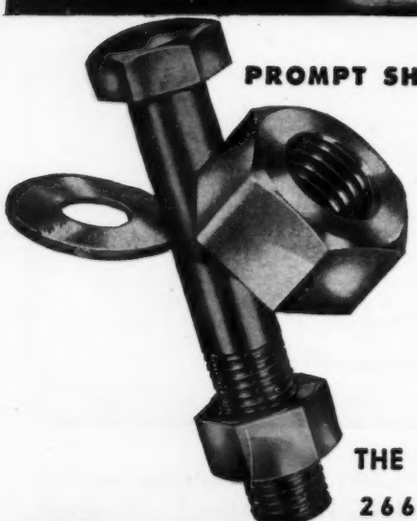

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LABOR DEVELOPMENTS *(continued)*

1. Wage increases to be used as a basis for price relief may be made without Wage Stabilization Board approval where the Board has issued a pattern order.

2. The Board is empowered to approve increases where employees' wage or salary rates have not been increased by 33 percent between January, 1941, and September, 1945. Formerly, the basis for computing the increase was straight-time hourly earnings.

3. In making adjustments for gross inequities, the Board will consider inequities between different industries in addition to intra-industry and intra-plant inequities.

***WSB APPROVAL NOT REQUIRED**

Employers having applications for wage adjustments before the Wage Stabilization Board before February 14, 1946, may now use those adjustments as a basis for seeking price relief from the OPA without awaiting further action by the Board on the applications. Automatic approval is given such adjustments for pricing purposes. Similar approval may be given wage increases promised or negotiated, but not effectuated, before February 14, provided the employer can produce proof that he had committed himself to such an adjustment before that date and that the increase was effected by March 15.

Application to the Wage Stabilization Board for approval for pricing purposes is not necessary for (1) employers of eight workers or less; (2) for the award of shift premiums of not more than 5 cents for the second shift and 10 cents for the third shift, of one week's vacation with pay, after one year's service and two weeks with pay after 5 years, and of holidays with pay not exceeding six annually; (3) for an increase of 18½ cents an hour in those basic steel and iron ore mining industries and steel fabricating and processing industries which were on strike on February 14, 1945; (4) for increases within the ceilings to be set by the Wage Stabilization Board for the industry or labor market area.

Moreover, the Stabilization Director has announced that wage increases may be effectuated until March 15, 1946, without Wage Stabilization Board approval, and such increases may be used for price relief purposes if application for approval is made to the Wage Stabilization Board within 30 days after effecting the adjustment.

NO APPROVAL REQUIRED

Increases up to 65 cents an hour may be granted by employers without approval of the Wage Stabilization Board. Moreover, such increases, though not approved, may be used as the basis for seeking price relief.

***APPROVAL REQUIRED**

Approval from a wage or salary stabilization board must still be obtained before effectuating the following adjustments: (1) Establishment of rates for new jobs either in new plants or in new departments of old

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FOR HALF a century some people, unacquainted with the facts and figures, have prophesied the passing of the industrial distributor; some even have advocated it. However, merely to consider what the end of the distributor would mean to your individual business is to see how absurd is the idea.

The value of the distributor to industry is too well recognized to require argument. Yet, with respect to the *cost* of the distributor's function there is much misunderstanding. Applying the axiom—"you can't get something for nothing", too frequently buyers jump to the conclusion that *they* pay extra for the conveniences of the distributor's service If, at times, they are able to secure a slightly lower price through direct negotiation, they find it easy to convince themselves that this represents a saving.

However, as countless buyers know, such a "saving" is more often apparent than real. It may be eaten-up quickly by the excessive costs of carrying adequate stock, and the multiplication of orders and resulting load of purchasing detail, which the buyer must assume.

Thoughtful consideration of the facts is certain to show that nobody pays extra when the distributor takes a profit. *Actually his profit is a small percentage of the savings which he effects for both seller and buyer.* The seller gets merchandise into the buyer's hands with less expense. The buyer gets the benefit of what amounts to cooperative purchasing and warehousing facilities for the major part of his requirements . . . which means a large saving over what it would cost to carry adequate stocks in his own plant.

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BOUGHT DIRECT	BOUGHT FROM DISTRIBUTOR
Price paid for Supplies bought Direct from Mfr.	Price paid for Supplies bought from Distributor
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Increased costs in Purchasing, Labor, Warehousing	Lower Purchasing, Labor, Warehousing costs
TOTAL ACTUAL COST of Industrial Supplies bought Direct from Manufacturer	TOTAL ACTUAL COST of Industrial Supplies bought from local Distributor

Makers of Jenkins Valves for more than four-score years, we know that Jenkins' customers are served better and more economically through Industrial Distributors than they could be through direct negotiation. Further, we are convinced that Industry can *profit* by fuller utilization of local Distributors, and in this advertising present some of the sound reasons for this conviction.

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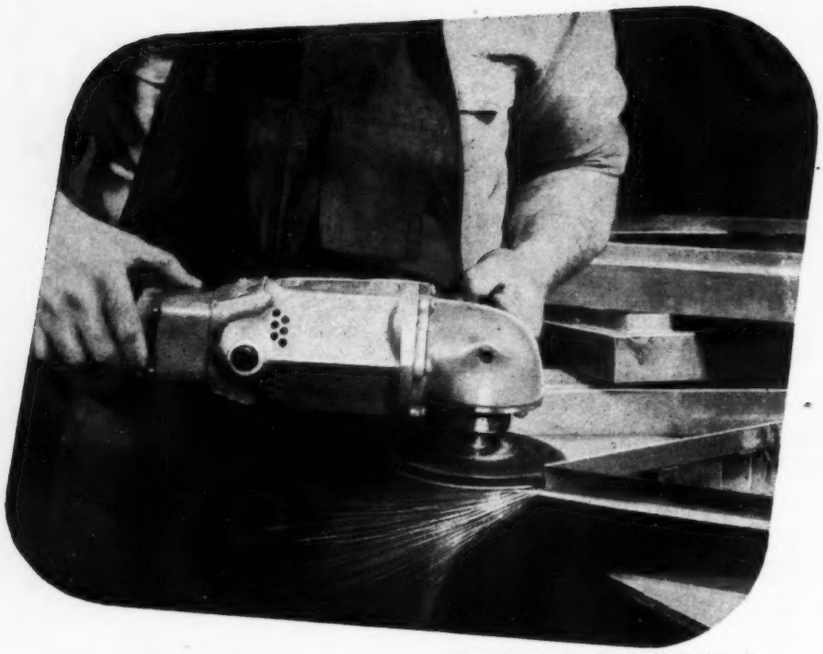

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plants; (2) increases in the building and construction industry; (3) increases for agricultural employees subject to Secretary of Agriculture's control; (4) increases under the War Labor Board's 1944 decision in the Basic Steel case; (5) wage and salary decreases.

WSB PRE-APPROVED ORDER

The Wage Stabilization Board has issued a pre-approved order for price relief purposes for the following adjustments:

1. Wage or salary increases not resulting in an hourly rate above 65 cents an hour.

2. Individual merit, length of service, or progression increases or bonus payments effectuated in keeping with a plan in effect before February 14, 1946, or approved thereafter.

3. Institution of incentive or piece rates for a new production item in plants where an established incentive wage or piece rate plan was in existence before February 14, 1946, or approved thereafter, provided the principles embodied in the existing plan are applied to the new item and that equivalent occupational earnings are maintained for equivalent effort.

*PRICE RELIEF FOR UNAPPROVED INCREASES

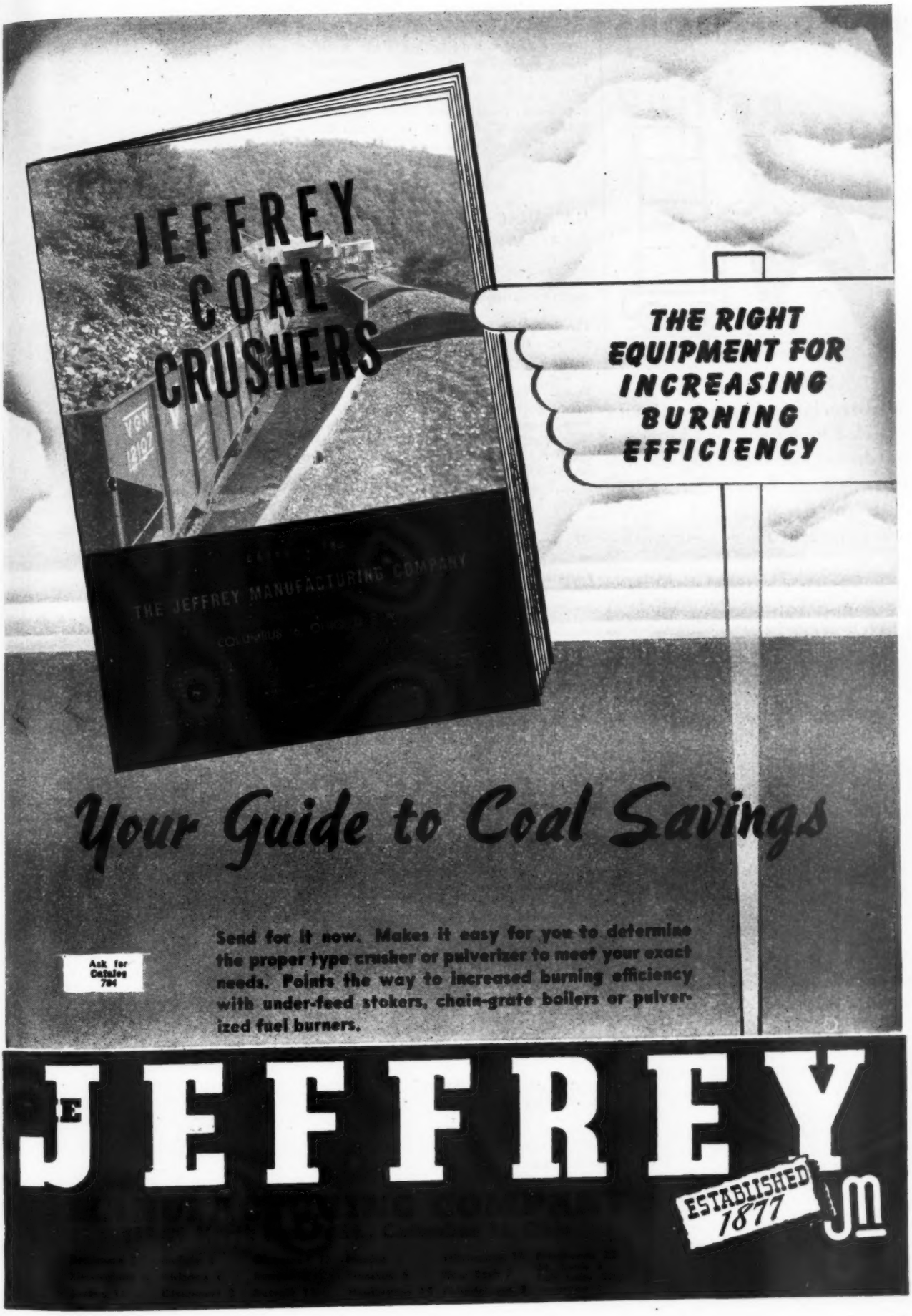
Employers effectuating unapproved wage increases may use these increases subsequently as a basis for seeking price relief provided they file, within 30 days of making the increases, a statement with their local stabilization board that they have no intention of seeking immediate price relief on the basis of the increase. If, at a subsequent date, however, relief is sought, approval may be requested for the increases and the price relief.

*WSB ISSUES FIRST PATTERN ORDER

The first "pattern" order to be issued by the WSB applies to firms in the meat packing industry that have followed the wage pattern of the Big Five companies in the industry. By virtue of the order, these companies may, without further approval, increase hourly wages 16 cents over the August 17, 1945, rates of their production workers, and may use these increases as a basis for seeking price relief. All other companies in the industry must file for approval of the 16-cent-an-hour increase if they wish to seek price relief on the basis of the increase.

*PREMIUM PAYMENTS NOT TO BE DISCONTINUED OR REDUCED

A regional war labor board has stated that employers may not discontinue or reduce premium payments required under the wartime Premium Pay Order without specific approval of the Wage Stabilization Board. Applications for reduction or elimination of such premium payments will be regarded as wage decreases. The regional board also announced that in reverting to peacetime premium payment practice, em-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LABOR DEVELOPMENTS *(continued)*

ployers may, without further Wage Stabilization Board approval, revert to the practice of paying double time for weekend work as such but cannot discontinue, without Wage Stabilization Board approval, double-time payments on the seventh consecutive day of work.

NATIONAL LABOR RELATIONS BOARD

*JUDICIAL REVIEW OF BOARD ORDERS LIMITED

The judiciary has been instructed by the Supreme Court not to delete any section of an NLRB order unless objection is made to the order by the employer before the Board. The Supreme Court ruled that a circuit court of appeals could not delete from a cease-and-desist order the phrase "in any other manner" interfering with the employees' right to self-organization on the ground that the employer himself had made no such objection. (NLRB vs. Cheney California Lumber Company, U. S. Supreme Court.)

MANAGEMENT MAY DENY REINSTATEMENT TO STRIKERS

Management has the right to refuse reinstatement to strikers where:

1. The strike is in violation of an existing collective agreement between employer and union.
2. The employer has not breached the contract.
3. The strike is not provoked by an unfair labor practice.
4. The refusal to reinstate is not predicated on the union membership of the strikers.

Where a union struck to obtain a wage increase, an act in direct violation of a then-existing valid contract containing a no-strike clause, the employer was upheld in his refusal to reinstate the strikers. The contract recognized the union as the exclusive bargaining representative of the unit, covered wages, other working conditions, and grievance procedure, and contained a no-strike clause. Although at a subsequent date, the union was found to be company dominated and the contract invalidated, the Board declared that the contract at the time of the strike was considered legal and binding upon the parties involved. (Scullen Steel Corporation.)

*DISCHARGE HELD IMPROPER IF PROPERTY RIGHTS ARE VIOLATED

Where an employee violated a company rule by having dangerous knives on company property, but the evidence of the violation was obtained only by searching his personal effects, an arbitrator deemed his discharge improper. Although violation of a company rule is sufficient reason for discharge, the arbitrator declared that violation of the employee's personal property rights was unjustified. (In re Arbitration between Campbell Soup Company and

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Every drop of the fluid you want cleaned gets cleaned by the Cuno "filter-fine" strainer.

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AUTO-KLEAN *disc-type.* For all fluids except those containing highly abrasive solids. Viscosities from 30 to 50,000 Saybolt seconds. Minimum pressure drop. Continuously cleanable by turning a handle (manually or automatically). Occupies no more space than usual partial-flow type. Sizes from 1¼" diam. x ⅞" cartridges to massive motor-driven models. Available with or without sump for built-in or external installations.

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Food, Tobacco, Agricultural & Allied Workers Union of America.)

*MASS PICKETING ENJOINED

Holding mass picketing to be equivalent to a sit-down strike, the Pennsylvania Supreme Court permitted the issuance of an injunction free of any restrictions imposed by the state Anti-Injunction Act. The court stated the Act did not restrict issuance of an injunction where the labor union "seizes or holds" a plant to compel the employer to accede to its demands. (Westinghouse Electric Corporation vs. United Electrical, Radio & Machine Workers of America, Pa., Supreme Court, W.D.)

*MASS PICKETING ILLEGAL THOUGH PEACEFUL

Although the picketing was conducted in a peaceful manner, two state courts declared mass picketing illegal because persons were prevented from entering or leaving the plant. The courts not only deemed such picketing illegal, but also declared it was not protected as a constitutional exercise of freedom of speech and assembly. The courts also stated that state courts of equity have the right to limit the number and conduct of pickets. No more than ten pickets may be posted at any one plant entrance. Furthermore, pickets must be kept in motion so as not to block entrances or exits of the plants. (Westinghouse Electric Supply Company vs. United Electrical, Radio & Machine Workers, Pa. Ct. of Common Pls; U. S. Electrical Motors, Inc. vs. United Electrical, Radio & Machine Workers, Calif. Supreme Court.)

*UNION SHOP CLAUSE AWARDED

Where the union was shown to be democratic in its administration, and a large proportion of the contracts it held provided for union shop, an arbitrator awarded the union a union shop clause in its first contract rather than a maintenance-of-membership clause preferred by the company. The employer, however, was protected to a certain degree by a contractual clause providing that new employees need not join the union for 90 days after hiring, during which time they could be dismissed. (In re Arbitration between Phoenixville Publishing Company and American Newspaper Guild.)

*UNION MUST PROVE MAJORITY STATUS

By virtue of a recent NLRB decision, a union is now required to define its majority status before it may call upon the employer to bargain collectively. Thus, although the union may attain a majority at a subsequent date and be deemed appropriate by the Board, it may not charge the employer with an unlawful refusal to bargain if, at the date of request to bargain, it failed to possess a majority.

Since, as the Board pointed out, violation of the Wagner Act in the form of refusal to bargain is dependent upon whether the union was representative of a major-

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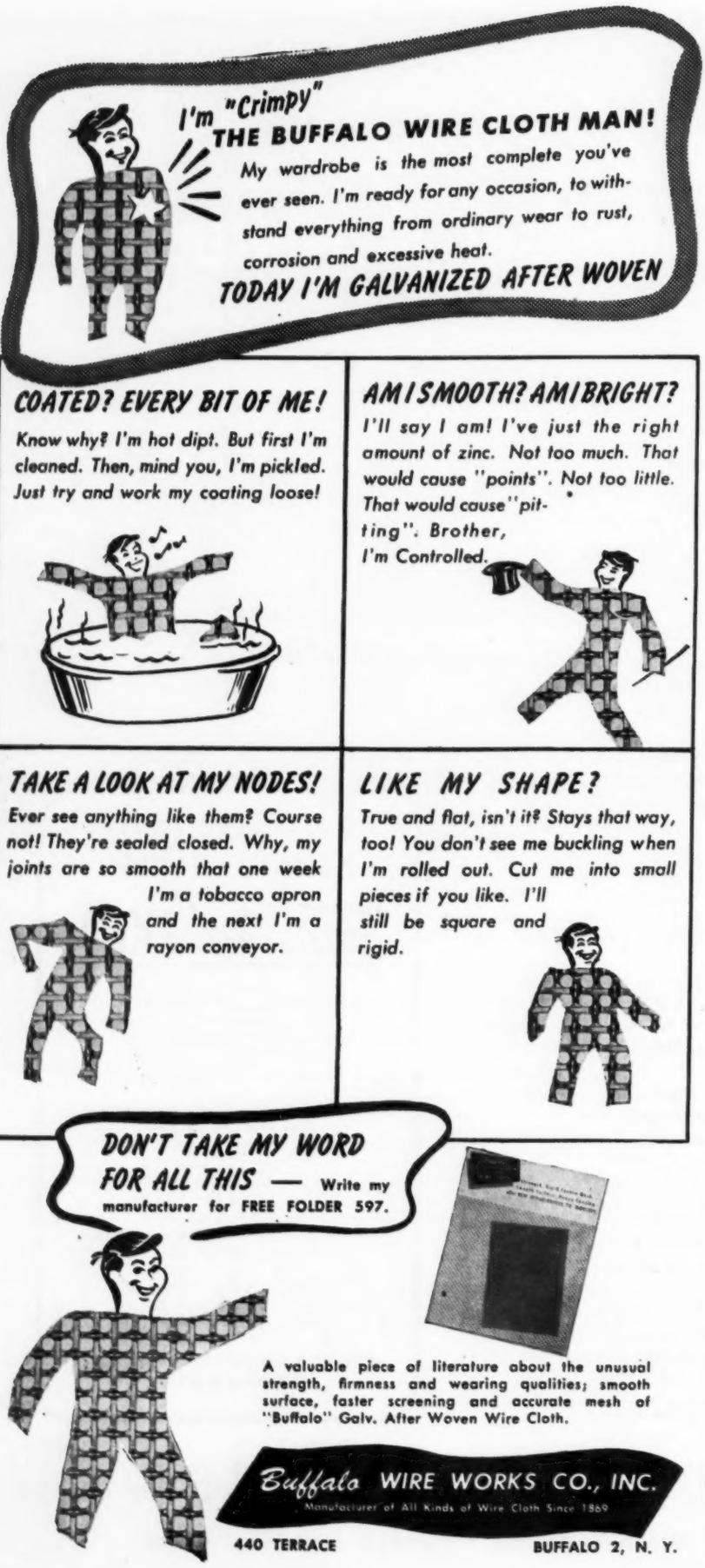
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ity at the time it sought to exercise bargaining rights, the Board refused to uphold the trial examiner's finding that the employer was guilty of an unlawful refusal to bargain where the union at no time represented more than half the employees in the unit. Furthermore, the fact that the union did represent a majority in an appropriate unit at a subsequent date did not alter the situation, since such majority was attained by revision of the unit, and the union never requested the employer to recognize it as bargaining agent of such a group. "Because a prior appropriate request for bargaining is a condition precedent to any finding of a refusal to bargain," the Board reversed the trial examiner and cleared the employer of charges of refusal to bargain. (Barlow-Maney Laboratories, Inc., NLRB.)

***UNEMPLOYMENT BENEFITS DENIED**

A state unemployment compensation board refused strikers unemployment benefits on the ground that work was not available to them because of their own fault, since a prerequisite to receiving such benefits in the particular state is that work be unavailable through no fault of their own. The strike, though not involving the employees in question, kept them out of work because of the union's instructions against crossing the picket line. The Board stated "that the claimants did not lend themselves cooperatively to the interests of their employer nor make a reasonable effort to return to work" and that therefore there was a voluntary suspension of work resulting from an industrial dispute. (Pennsylvania State Compensation Board of Review)

***RIGHT TO VOTE DENIED STRIKERS**

Although the strikers were placed on a rehiring list in keeping with the strike settlement, they were denied the right to vote in a representation election on the ground that the possibility of their being rehired was slight. Rehiring was rendered highly improbable by the cancellation of the company's war contracts. In a second case the employees' inability to produce the peacetime products of the company was deemed sufficient reason to deny them the right to vote once they had been laid off upon reconversion. (Rockford Metal Products Corporation, NLRB; Balorank, Inc., NLRB.)

EMPLOYEES' DESIRE TO DETERMINE APPROPRIATE UNIT

The employees' desire was held to be the controlling factor in determining whether bargaining is to be conducted on the basis of a single two-plant unit or in two separate units. Although the history of bargaining in the plant pointed to the retention of a single unit, the Board maintained an election to determine the employees' preference would be more satisfactory since the employment in the plant had increased 500 percent over five years

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Simplex 30 and 50-ton Hydraulic Jacks have eliminated heavy load lifting from the list of tedious, time-consuming jobs. Throughout industry, lifting and moving heavy machinery and other high-tonnage loads is accomplished with a speed and ease previously unknown. Simplex Hydraulic Jacks can be used in horizontal or vertical position, and have double lever sockets to speed operation in close quarters. Ruggedly built, they have a safety factor of 50%.

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LABOR DEVELOPMENTS *(continued)*

ago. (Anchor Hocking Glass Corporation, NLRB.)

***FOREMEN ENTITLED TO REPRESENTATION**

In three recent decisions, the NLRB has further enunciated its principle with regard to supervisors' organizing a bargaining unit. In one case, the Board held that general foremen, foremen, and assistant foremen of a large insulation board manufacturing company constituted an appropriate unit despite their substantial supervisory duties. The Board points out, in another case, that supervisors may be employers to their subordinates and employees to management. It is whether they are acting in management's interest or their own interest that is the determining factor. In the third case, the Board declared that supervisors of different levels have the choice of forming one unit or more than one. (Celotex Corp.; Federal Mogul Corp.; Kelsey-Hayes Wheel Co., NLRB.)

***SUPERVISORS REPRESENTED BY UNION OF PRODUCTION EMPLOYEES**

By virtue of a recent decision of NLRB supervisors have the right to be represented not only by a union to which production employees are affiliated, but by one which is an integral part of such union. The Board declared two units appropriate, one for supervisors of production workers and one for supervisors of clerical and technical workers, excluding from both units those participating in policy making. Overruling the employer's objections to supervisor's units, the Board averred that the type of industry is irrevelant to the establishment of such bargaining unit; that supervisors as employees have the right to statutory protection of their bargaining rights, despite their obligations under state safety laws which allegedly preclude their union organization; that while the particular industry's tradition may influence the grouping of employees for bargaining purposes, it could not override their statutory right to bargain. (Jones & Laughlin Steel Corporation, NLRB.)

***HELD DOMINATION**

Despite the successor union's efforts to rid itself of any kind of domination, the NLRB found the union company dominated. The Board based its decision on the facts that the officers of the original union initiated and sponsored its successor, the representatives active in the original union were similarly active in the successor, and no definite cleavage had been made between the old and new union since the employer did not disestablish the original union until after the successor had been organized and sought recognition. (Neptune Metal Co., NLRB.)

***HELD REFUSAL TO BARGAIN**

Although the employer recognized the union as the bargaining agent and never directly refused to bargain with it, the Board found him guilty of an unfair labor practice because of his rushing through conferences, handling wage matters on an individual basis, and treating grievances as an invasion of managerial functions. (Kalamazoo Coaches, Inc., NLRB.)

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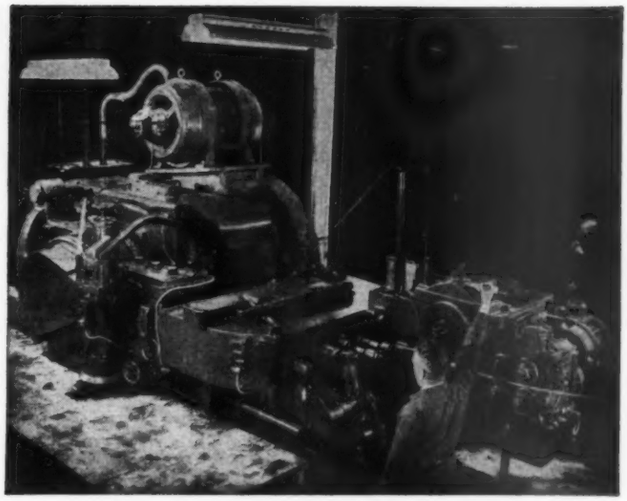

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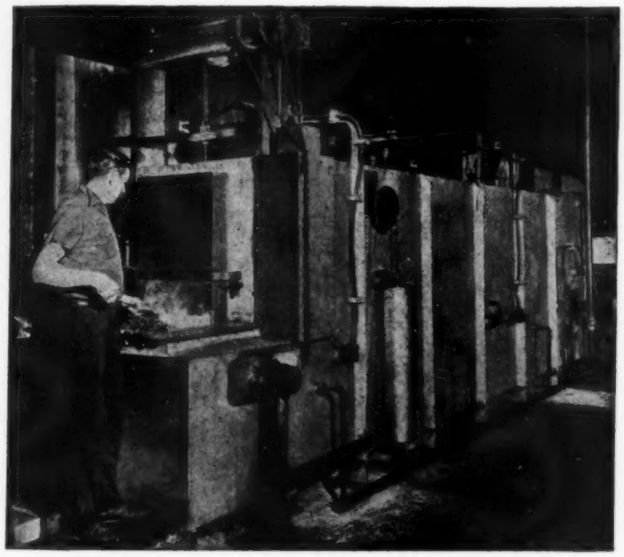

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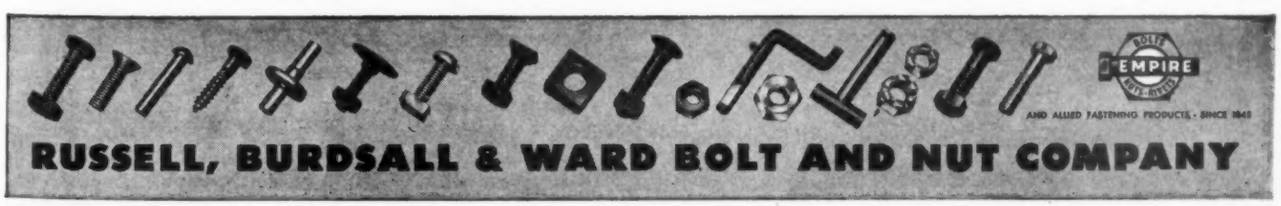

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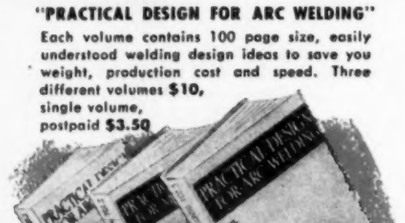

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EFFECT OF CONSTRUCTION CONTROLS ON INDUSTRY

New federal controls imposed by the Civilian Production Administration on all forms of construction are a matter of deep concern to all segments of manufacturing industry. How seriously the regulations will affect construction enterprises in this category, however, will depend more upon how the regulatory order is interpreted in specific cases than upon the precise wording of the order itself.

So far as the sum total of construction in the manufacturing industries is concerned, some construction authorities are of the opinion that the principal difficulty with the order will come simply from the nuisance of having to get approval from a branch board of CPA on any new job of more than $15,000 before the work can be started. Nevertheless, the order is loaded with technicalities, and merits close study by any company contemplating either new construction or repair work, including jobs under $15,000 as well as those of larger size.

It should be noted especially that there are three main classes of industrial construction to continue: (1) Jobs of any size that had been started by March 26, 1946; (2) new jobs having an individual cost of $15,000 or less; (3) any other new job that may be approved by CPA as "essential." According to the wording of the order, a strong point toward official decision that a job is essential will be evidence that it is related "to the elimination of a bottleneck in the reconversion of the national economy from a wartime to a peacetime basis."

To assist in determining whether a construction job is essential, CPA will have 71 district offices with advisory committees of local citizens.

Leaders in the heavy construction industry are generally of the opinion that there will be little or no reduction in total volume of construction in the manufacturing industries. It is estimated that about $253,000,000 worth of industrial construction is now in progress, all of which is privileged to be completed. Meantime, although for the next few weeks it is probable that there will be delays in getting CPA approvals, followed by a brief period in which the essentiality of new projects will be severely interpreted, it is probable that the volume of new jobs approvals plus jobs that do not require approval will at least be equal to the fast-finishing part of the work now in progress.

The period of severe interpretations is not expected to last long, for a number of reasons. First is the fact that the announced purpose in issuing the order was to help push the national program of residential construction, and it should not take long to persuade CPA that only about 15 percent of the materials used in industrial construction have any applicability to residential use, and that there is sufficient labor available for residential work, drawing but little, if any, from heavy construction. Another factor that will tend to relax the severity of interpreting essentiality will probably come from community pressure directed to the CPA boards in the many cases in which it can be shown that industrial construction is needed to create employment not only in the project itself, but also in the subsequent enterprises within the structures created.

Text of the CPA order is as follows:

(A) In order to carry out the veterans' emergency housing program, this order forbids the beginning of construction and repair work on buildings and certain other structures without specific authorization under paragraph (H) of the order, with the exception of certain small jobs and other work covered by paragraphs (D), (E), and (F). The restrictions of the order apply whether or not the materials needed are on hand or are available without priorities assistance.

(B) Structures and work covered by this order.

(1) Kinds of structures:

The restrictions of this order apply to certain kinds of work on structures. As used in the order, "structure" means any building, arena, stadium, grandstand, pier, moving-picture set, or billboard, whether of a permanent or temporary nature. (However, the erection of stands or other structures which have been used before and are being erected only for a temporary purpose and are to be taken down after the temporary purpose is served is not covered by the order.)

The term "structure" does not include roads, streets, sidewalks, railroad or street or interurban or plant railway tracks or operating facilities (other than buildings), fences, silos, trailers (except when demounted and

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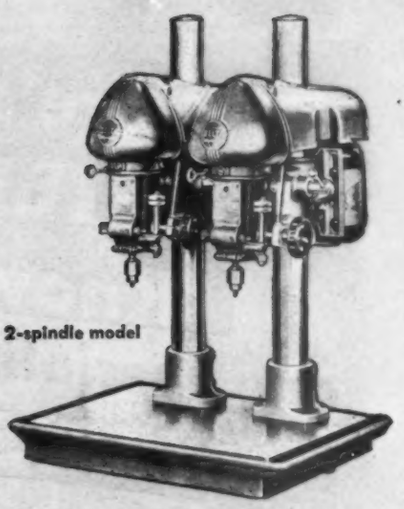
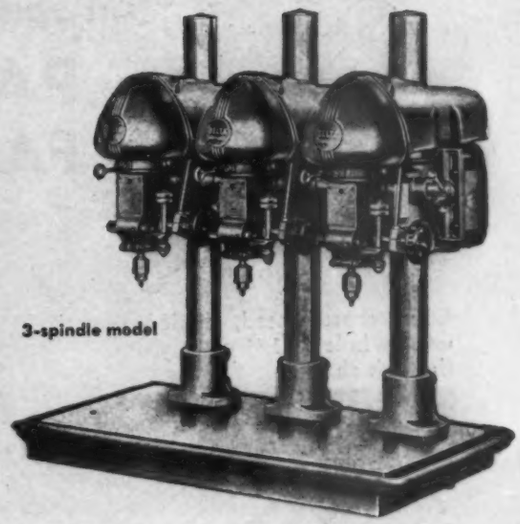
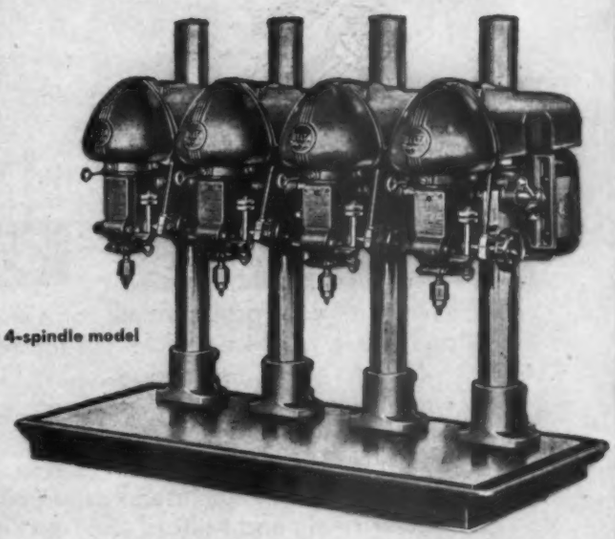


2-spindle model



3-spindle model



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installed on a foundation), bridges, tunnels, subways, pipelines, utility facilities (except buildings) providing for electric, gas, sewerage, water, central steam heating, or telephone or telegraph communication services, including power or utility lines and sewers, surface or underground mines, wells, dams, canals, or drainage or irrigation ditches.

The term "structure" also does not include anything that is not attached to the land or to a structure as defined above, or any kind of equipment installed outside of and not attached to a building or other structure.

(2) Kinds of work. The restrictions of this order apply to constructing, repairing, making additions or alterations (including alterations incidental to installing any kind of equipment), improving or converting structures, or installing or relocating fixtures or mechanical equipment in structures.

These terms include any kind of work on a structure which involves the putting up or putting together of processed materials, products, fixtures, or mechanical equipment, if the processed materials, products, fixtures, or mechanical equipment are attached to the land, or are attached to a structure and used as a functional part of the structure, or are attached so firmly to the land or structure that removal would injure the material, product, fixture, or mechanical equipment or the structure.

The laying of asphalt or other tile or linoleum cemented or otherwise attached to the structure is covered by the order.

However, repainting, repapering, and sanding floors, and greasing, overhauling, repairing, or installing repair or replacement parts in existing mechanical equipment in all types of structures, where no change in the structure is made, are not covered by the order.

(3) Fixtures and mechanical equipment. The term "fixture" means any article attached to a building or structure and used as a part of the building or structure. The term "mechanical equipment" means any equipment which is used to operate a building or other structure.

The following items are included within the phrase "fixtures and mechanical equipment" if they are attached to the building or structure in any of the ways indicated later in this paragraph:

Plumbing, heating, ventilating and lighting equipment, paneling, bookcases, bars, soda fountains, showcases, booths, wood or metal partitions, counters, and the like. These articles are considered to be attached to a building or structure if they are attached by nails or

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screws to the building, if they are connected to the plumbing or other piping system of the building, if they are connected to the lighting system of the building (except by connection to an existing outlet), or if a base or foundation is built for the item, or if the item is cemented to the building or structure.

The phrase "fixtures and mechanical equipment" does not include the following:

Machine tools, blast furnaces, conveyors, elevators, process piping, control or testing equipment used for industrial or utility purposes or in a laboratory, power generating or transmitting equipment, such as boilers, generators, transformers, and the like (however, where the purpose of boilers, transformers, and similar equipment is primarily to provide electricity or steam for lighting or heating the building in which they are installed, they would be mechanical equipment), medical equipment in a hospital, washing machines or dryers in a commercial laundry, compressors or cooling equipment in a cold storage warehouse or frozen food locker plant, gasoline pumps and hydraulic lifts in a garage or service station, and stoves, refrigerators (other than refrigerators constructed as an integral part of a building), food-warming equipment and dish-washing equipment in a restaurant.

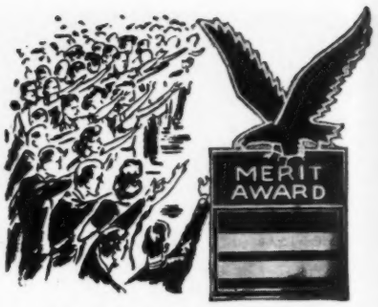
(C) Prohibited construction.

1. No person shall begin to construct, to repair, to make additions or alterations to, to improve, to convert from one purpose to another, or to install or to relocate fixtures or mechanical equipment in any structure, public or private, in the 48 states and District of Columbia, Puerto Rico, or the Virgin Islands, except to the extent permitted under paragraphs (D), (E) and (F), or when and to the extent specifically authorized under paragraph (H).

No person shall carry on or participate in any construction, repair work, addition, improvement, conversion, alteration, installation or relocation of fixtures or mechanical equipment prohibited by this order.

The prohibitions of this paragraph apply to a person who does his own construction work, to a person who gets a contractor to do the work, to contractors, subcontractors, architects and engineers working on a job which is being carried on in violation of this order or getting others to work on it or to supply materials for it.

(2) This order forbids the beginning of certain kinds of work. To "begin" work on a structure means to incorporate into a structure on the site materials which are to be an integral part



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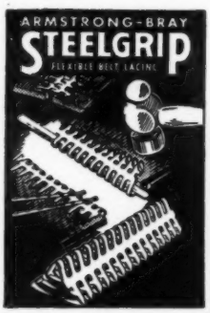

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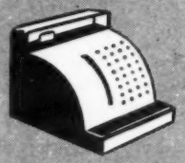

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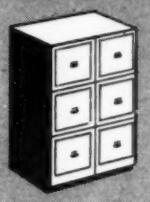

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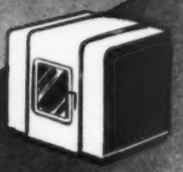
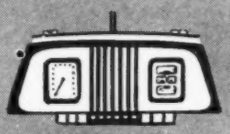
HEATING EQUIPMENT



HOME APPLIANCES



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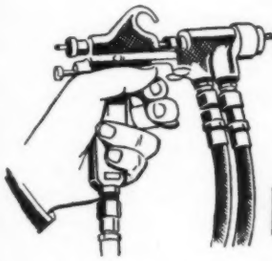
YOUR PRODUCT



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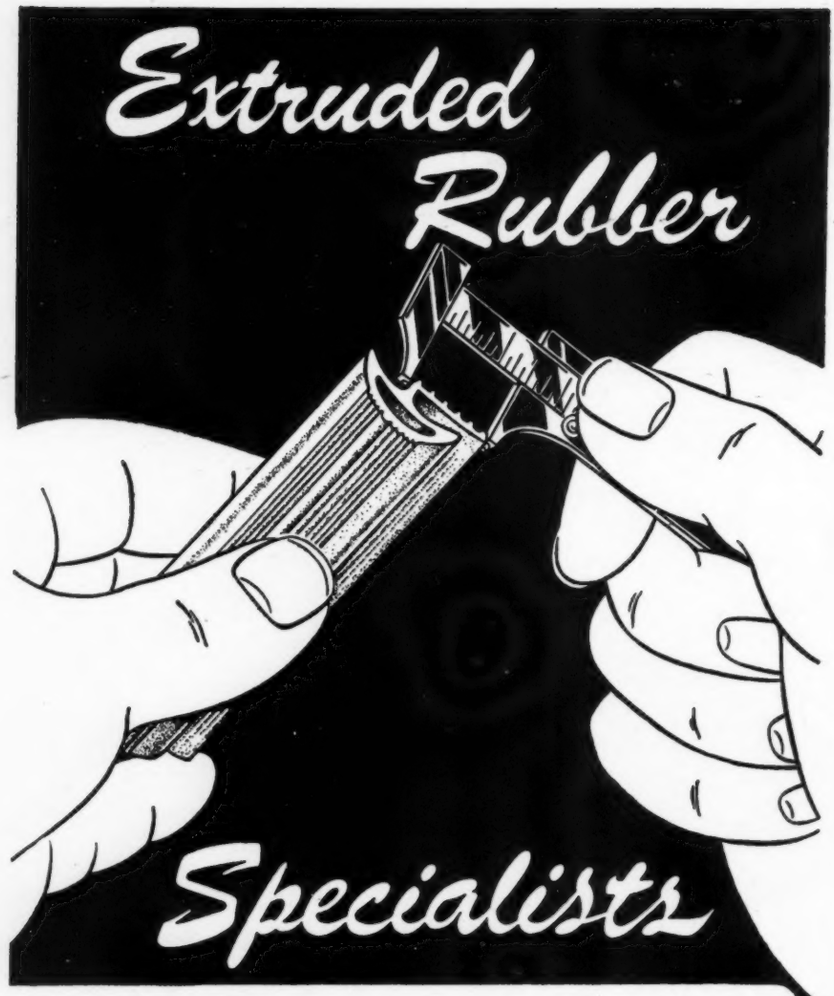

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of the structure in question. Demolition, excavation, and similar site preparation do not constitute beginning construction. The order does not apply to work which was begun before March 26, 1946, and which was being carried on on that date and which is carried on normally after that date. However, this rule only applies to the particular building or other structure begun before March 26, 1946. It does not apply to any other building or structure which had not itself been begun by that date even though the two are closely related.

(D) Exemption for small jobs.

(1) This order does not restrict a construction, repair, alteration or installation job, the cost of which does not exceed the allowance given below for the particular kind of structure involved:

(I) $400 for a house or other structure (such as a garage) on residential property designed for occupation by five families or less. This allowance also applies to farmhouses and other housing accommodations on farms, except bunkhouses and other accommodations for transitory farm laborers.

(II) $1000 for a hotel, resort, apartment house, or other residential building designed for occupancy by more than five families.

(III) $1000 for a building used primarily for one or more commercial or service establishments such as offices, banks, stores, laundries, garages, restaurants, night clubs, theaters, repair shops, warehouses, frozen food locker plants, and radio stations.

(IV) $1000 for a farm, excluding farm houses which are covered by Paragraph (D) (1) (I) above. A farm means a place used primarily for raising crops, livestock, dairy products, or poultry for the market.

(V) $1000 for a church, hospital, school, college, or a publicly owned building used for public purposes, or for an orphanage or other building used exclusively for charitable purposes.

(VI) $15,000 for a factory plant, or other industrial structure which is used for the manufacturing, processing, or assembling of any goods or materials, for a logging and lumber camp, for a pier (other than a pier designed for amusement, entertainment, or other commercial purposes), for a structure used for or in connection with a railroad or street railway or a commercial airport, for a bus terminal, for a truck terminal operated by a common or contract carrier by truck, or for a research laboratory or pilot plant, or for a motion picture set. This allowance is applicable to structures used for oil, gas, or petroleum producing, refining, or distributing (except service stations and garages which are covered by Para-

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General Motors' engineers state that diesel engines are now so refined that they are creating a demand for special fuels with specific properties.

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Texas Industrial Co. of Houston, Texas, has developed a radial diesel aircraft engine, from government surplus, into a power plant capable of lighting a town with 300 population.

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A relay capable of speeds up to 1,000 operations per second has been developed by Stevens-Arnold.

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Measuring 9 inches in diameter, a new hydraulic pump made by Hydraulic Machinery Co. of Detroit is said to develop 5,000 lbs. per square inch pressure.

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B. F. Goodrich has broken ground for a new research laboratory on a 260-acre tract between Akron and Cleveland.

DuPont reports the development of porcelain enameling on aluminum castings.

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The world's largest concrete dam and hydro-electric plant will be built by the Chinese on the Yangtse River.

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Victor Division of RCA is using electronic heating to seal in the metal contacts in cathode ray tubes.

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The new Crosley automobile engine is built largely of sheet steel stampings and develops 26 h.p. with a weight of only 59 lbs.

The City of New Orleans proposes to expedite its future traffic by building a tunnel under the Mississippi.

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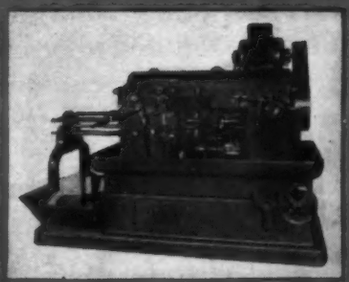

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graph (D) (1) (III) above). It is also applicable to utility structures (public or private) providing for electric, gas, sewerage, water, central steam heating, or telephone or telegraph communication services.

(VII) $200 for a structure covered by this order which does not fall within one of the classes listed above.

(2) For the purpose of determining whether a particular job is exempted from this order by Paragraph (D), the "cost" of a job means the cost of the entire construction job as estimated at the time of beginning construction.

This includes cost of paid labor engaged in the construction work, regardless of who pays for it; the cost or value of new fixtures, mechanical equipment, and materials incorporated in the structures, whether or not obtained without paying for them, and the amount paid for contractors' fees.

It does not include the cost or value of previously used fixtures, mechanical equipment, and materials, the value of unpaid labor, or the cost or value of machinery and equipment (other than mechanical equipment), or the cost of labor engaged in assembling and installing the machinery and equipment.

(3) For the purpose of this exemption, a related series of operations which are performed at or about the same time or as part of a single plan or program constitute a single job. No job which would ordinarily be done as a single piece of work may be subdivided for the purpose of coming within this exemption.

When a building or part of a building is converted from one purpose to another, all work incidental to and done in connection with the conversion must be counted as one job. So, also, if a building is being renovated, improved, or modernized over an extended period, all work done in connection with the modernization (other than work done before March 26, 1946) must be considered as part of one job, even though separate contracts are let for the different parts of the work. The definition of a job given in this paragraph may not be used in determining whether construction has started prior to the issuance of the order under Paragraph (C) (2).

(4) If a structure is used for more than one purpose and might therefore fall within more than one of the classes indicated, the use to which the greatest part of the structure will be put (computed on the basis of the floor area where applicable) determines the allowance. If a structure is being converted from one purpose to another, the allowance applicable to the structure after the conversion is the maximum allow-

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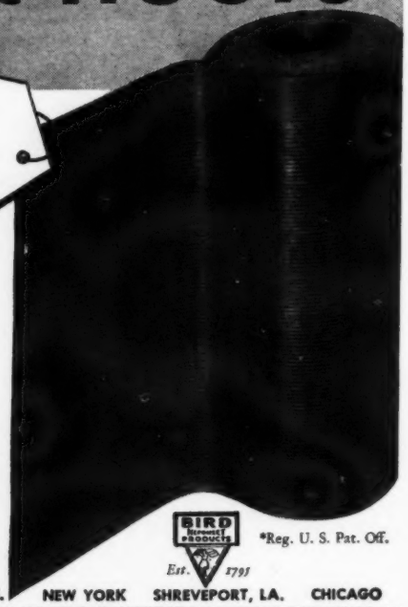

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Electric Wheel Co., Dept. FA Quincy, Ill.

ance for the conversion. The allowances given for jobs on a structure apply to all subordinate or related structures situated near and used in connection with the structure.

(E) Exemption for repair and maintenance work in industrial utility and transportation buildings and structures. The prohibitions of this order do not apply to maintenance and repair work in structures covered by paragraph (D) (1) (VI) of this order.

For the purpose of the exemption given by this paragraph, "maintenance" means the minimum upkeep necessary to keep a structure in sound working condition, and "repair" means the restoration of a structure to sound working condition when the structure has been rendered unsafe or unfit for service by wear and tear, damage, failure of parts, or the like. However, neither maintenance nor repair includes the improvement of any structure by replacing material which is still usable with material of a better kind, quality, or design. No maintenance or repair work which is capitalized by the person doing the maintenance or repair work may be performed under this exemption.

Alterations to a building or other structure covered by Paragraph (D) (1) (VI), including alterations incidental to installation of equipment, are not exempted by this paragraph, even though they are not capitalized, and may only be done when and to the extent permitted under Paragraph (D) or when specifically authorized.

(F) Other exemptions.

(1) Disasters.

(I) The prohibitions of this order do not apply to the minimum work necessary to prevent more damage to a building or structure (or its contents) which has been damaged by flood, fire, tornado, or similar disaster. This does not include the restoration of the structure to its former condition.

(II) The prohibitions of this order do not apply to the repair, rebuilding, or reconstruction of any house (including a farmhouse) or any farm building which was destroyed or damaged by fire, flood, tornado, or similar disaster, if the total cost of the repairs, rebuilding, or reconstruction does not exceed $6000 and if the reconstruction is started within 60 days of the occurrence of the disaster.

(2) Military construction.

The prohibitions of this order do not apply to work by or for the accounts of the United States Army or Navy.

(3) Veterans' Administration.

The prohibitions of this order do not apply to work on construction projects of the Veterans' Administration, including projects being built by the Corps

Where 500 pieces per grind is really *Something*

A FIRTHITE application

Conditions:

Depth of cut - - - 3/32"
Feed per revolution - 0.016
Cutting speed - - - 250 feet per minute

Turning, facing and chamfering a cast iron sleeve with Firthite sintered carbide tools on this job just meant about five times as many pieces per grind. Better production, less downtime, uniformly better products and a big reduction in grinding costs were the results.

If you have a cutting problem:

Call Firth-Sterling STEEL COMPANY

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PRESSURE, TEMPERATURE, FLOW, ELECTRICAL AND LEVEL MEASURING INSTRUMENTS

UNITED STATES GAUGE

6 out of 10 manufacturers of original equipment specify U.S.G.

DIVISION OF AMERICAN MACHINE AND METALS, INC.

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SAW FILING...

Inaccurate saw filing can ruin the cutting efficiency of the best saws, perhaps crack or break them. The machine precision of Foley Saw Filing can increase your sawing output 25% to 40%. The Foley *automatically* joints the saw as it is filed, making all teeth uniform in size, height, spacing. Foley-filed saws run cooler, cut fast, do beautiful work—and stay sharp longer.

30-DAY TRIAL of the Foley Saw Filer is offered—to show you what a difference Foley-filed saws can make.

· FOLEY *Automatic* SAW FILER ·

FOLEY MFG. CO., 45 2nd Street N. E., Minneapolis 13, Minnesota

Please send literature on the Foley Automatic Saw Filer and details of your 30-Day Trial.

*Name*_____

*Address*_____

of Engineers for the Veterans' Administration, or to the remodeling of a building or any part of a building which has been leased to the Veterans' Administration or to Public Buildings Administration for occupancy or use by the Veterans' Administration.

(G) Prohibited deliveries. No person shall accept an order for, sell, deliver, or cause to be delivered materials which he knows or has reason to believe will be used in work prohibited by this order.

(H) Authorizations. Persons who wish to begin work which is prohibited by this order may apply for authorization. If the application covers housing accommodations under priorities regulation 33 (including farm dwellings), it should be made on form CPA 4386. Applications for non-farm housing accommodations should be filed with the local office of the Federal Housing Administration. Applications covering housing accommodations on a farm should be filed with the appropriate county Agriculture Conservation Committee.

The assignment of ratings for or approval of housing accommodations under priorities regulation 33, whether before or after the issuance of this order, constitutes an authorization under this order to do the work for which priority assistance or approval was given under that regulation.

If the application covers work on a farm (other than farm dwellings), the application should be made on form CPA 4423 and should be filed with the appropriate county Agricultural Conservation Committee. If work on any other kind of structure is involved, the application should be filed on form CPA 4423 with the appropriate construction field office of the Civilian Production Administration.

Applications will be reviewed to see whether and how much the proposed construction would interfere with the veterans' emergency housing program. In addition, the essentiality of the proposed work in relation to the veterans' emergency housing program, to the elimination of a bottleneck to the reconversion of the national economy from a wartime to a peacetime basis, to the public health and safety of the community, or to eliminate an unusual and extreme hardship will be taken into consideration in determining whether the application should be approved.

In case of emergency, a request for authorization may be made by telegram to the appropriate Civilian Production Administration construction field office. The telegram should state the nature of the emergency (fire, flood, etc.), the

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THIS is a Sterling Salt Tablet. It attacks the *cause* of heat sickness scientifically and surely by replacing the body's salt as it is lost through excessive perspiration.

It can greatly reduce the toll of heat sickness in your plant this summer . . . 4 to 6 tablets a day with water are normally sufficient for protection.

Install handy Sterling Salt Tablet Dispensers—at drinking fountains throughout your plant—now. They make tablet dispensing easy—act as effective reminders to your workers to take one of these pure, grain-accurate tablets every time they take a drink.

Sterling Salt Tablets of purest, compressed granulated salt

Quantity	*Size*	*Price*
Case 6/1500's	10-grain	$2.60
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EXTRA ENERGY SALT AND DEXTROSE TABLETS

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Sterling Tablet Dispensers—durable plastic housing; one-at-a-time supply feature

500-tablet size	$3.25
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All prices include delivery

Sterling offers you FREE safety posters. Here's the Sterling Salt Tablet story in a nutshell for your workers. Displayed prominently in your plant, it helps ward off heat sickness . . . saves man-hours waste. Write today.

Sterling SALT TABLETS

INTERNATIONAL SALT COMPANY, INC., Scranton, Pa.

use to which the building will be put, the type of construction, the estimated cost of construction, and the reasons why immediate reconstruction is necessary.

(I) Construction under authorizations.

When a person is specifically authorized, either by approval of Form CPA 4423 or Form CPA 4386 or otherwise, to do work restricted by this order, he must observe the restrictions imposed on him by the authorization, and in doing the authorized work, he must not do any work of the kinds covered by the order unless it is specifically covered by the authorization. He may not, in connection with a job which has been specifically authorized, do additional work under the exemption given by Paragraph (D).

When an application on Form CPA 4423 has been approved a placard will be sent to the applicant stating that the construction has been approved under this order. The applicant must place in the placard the project serial number and must set up the placard in front of the project site in a conspicuous location within five days after construction has been started and he must keep the placard there until completion of the building.

(J) Violations. Any person who willfully violates any provision of this order or who, in connection with this order, willfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priorities control, and may be deprived of priorities assistance.

(K) Communications. All communications concerning this order should be addressed to the Civilian Production Administration, Washington 25, D. C., Ref: VHP-1.

(L) Reports. All persons affected by this regulation shall file such reports as may be requested by the CPA, subject to the approval of the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

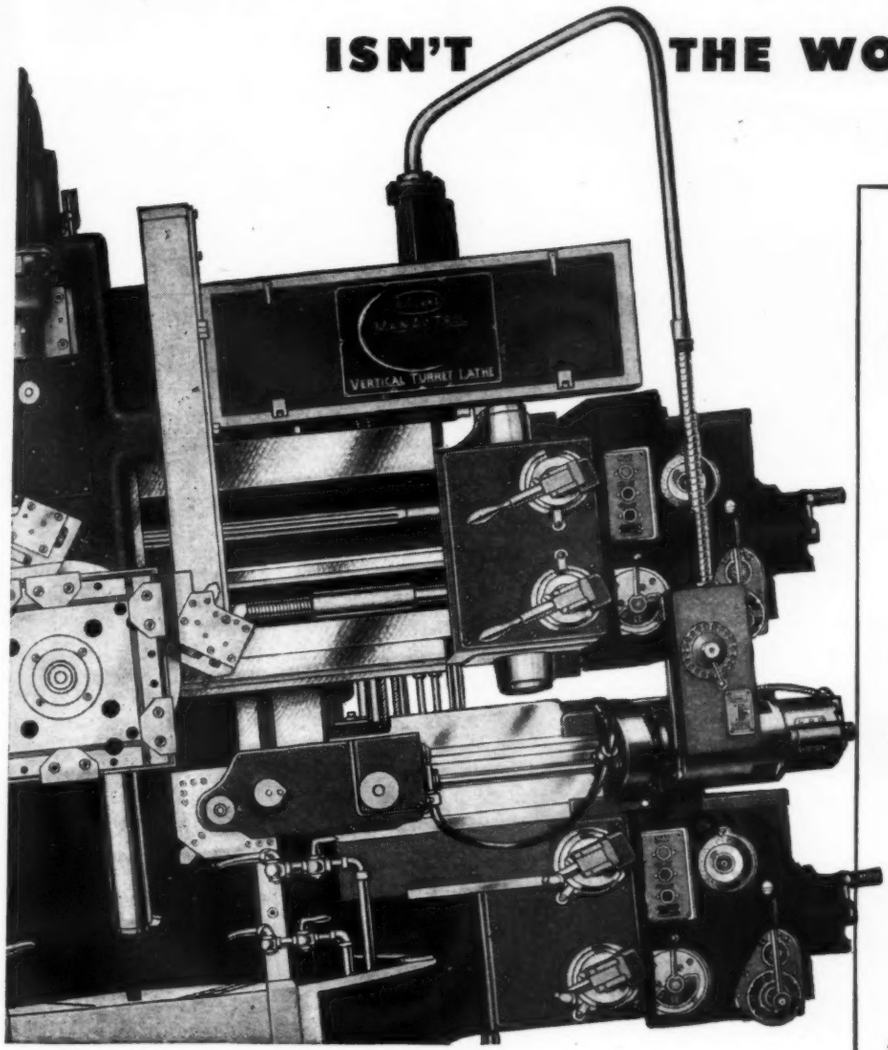
Time Now to Consider Annual Wage Plans

EDWIN E. WITTE, Professor of Economics, University of Wisconsin, writing in the *Harvard Business Review.*

Interest is low now in plans to provide a fuller measure of security to wage

Reconversion

ISN'T THE WORD FOR IT!



Reconversion means changing *back*. What business needs today is to change *forward* . . . to new machines and new methods that will increase output per man-hour . . . thus lowering unit costs so that more and more people can buy.

That is the only way higher wages and more jobs can be created while business retains the adequate return on investment that pays for the new machines and new methods. The Bullard Company, Bridgeport 2, Connecticut.

BULLARD CREATES

NEW METHODS

TO MAKE MACHINES DO MORE

for example:

See how the

BULLARD MAN-AU-TROL

Vertical Turret Lathe lowers unit production costs

Lightens Labor's Load. Operator machines one piece manually, setting production method into automatic cycle; then merely loads, supervises and unloads while MAN-AU-TROL does the work.

Makes Automaticity Versatile. Automatically handles any work within manually-operated scope of Vertical Turret Lathe. Converts instantly to manual operation on same or entirely different piece without affecting automatic cycle.

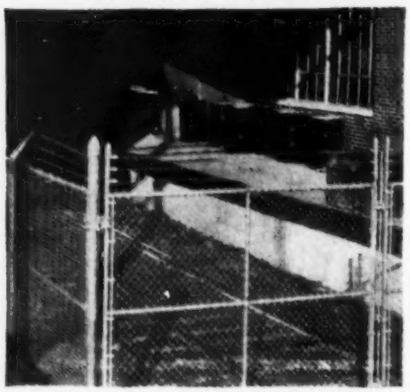
Saves Set-up Time. Set-up time from one class of work to another is only slightly more than for a manually-operated machine.

Reduces Salvage Cost. Machines day after day with consistent accuracy not obtained under manual operation.

Safety and Protection
MORE IMPORTANT THAN EVER

THE ONLY CHAIN LINK FENCE MADE OF * KONIK STEEL

KONIK is the registered tradename for the patented steel containing copper, nickel and chromium used in Continental Chain Link fence fabric. KONIK possesses a greater tensile strength and higher elastic limit and is rust-resistant "clear through." All the extra value of this modern steel now comes to you only in Continental Chain Link fence.



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Continental fence has 14 distinctive construction features including heavier line posts . . . stronger and more easily operated gates . . . improved pivot-type hinges . . . self-locking barb arms . . . and 20% more ties . . . fabric of rust-resistant, full gage wire of KONIK steel with heavy uniform zinc coating. Continental fence combines style with durability and positive protection for your property.

TAILORED TO FIT YOUR PROPERTY

Experienced fence engineers plan and help erect Continental Chain Link fence anywhere. No matter what your property protection problem, Continental fence is designed for your installation, then custom-built for quick erection on the site. Correct and economical construction can be done by trained erection crews. When local labor is to be used, Continental can supply a competent foreman and inspection service. *Write for FREE fence manual.*

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earners, but the need for such plans is much greater than it was during the war, says Professor Witte. He points out that if industry does not satisfy the quest for security, there will be more and more demands for government to do it.

Witte examines the question whether the objective of a stable minimum income from employment is sound. "Do not higher wage rates compensate employees adequately for irregularity of employment?" he asks. He finds "Normally, irregularity of employment results in relatively low, not high, average annual earnings . . .

"Nor is it true that most employees are as well off with irregular earnings as with stable incomes of the same amount on an annual basis."

"Stable employment also is clearly of advantage to industry" he adds. "Employers operate their plants intermittently, not because it is more profitable to operate in this manner, but because they believe that market and competitive conditions make it necessary. Steady operation results in better utilization of capital and reduces the overhead costs per unit. It also lessens labor turnover and the costs incident thereto . . . There also is no doubt that steady employment pays dividends in improved labor relations. It is not surprising that production workers very generally have little loyalty to the company employing them when they are constantly in fear of losing their jobs.

"In considering the practicality of annual wages, it is a mistake to look upon this device as posing the problem of guaranteeing employment and income to all production workers. The real problem is one of making secure a larger percentage of the employees."

Professor Witte concludes. "If our economy of free enterprise is to endure, it must provide a satisfying degree of security to the great majority of the industrial wage earners. Such security now exists for a large percentage of all employees." It is the responsibility not merely of industry collectively but of each and every employer to increase that percentage. "Indeed, it is only through the action of individual employers that such security can be provided."

The Wagner Act Has Influenced Management

LEE H. HILL, Publisher, *Electrical World* and *Electrical Contracting*, speaking before the National Industrial Conference Board

Tracing the influence of the Wagner Act on industry, Lee Hill shows how management has accepted the principles of collective bargaining, done its part

Automatic MONORAIL System

Loading bucket at speedmuller

Push button control dispatches carrier

Automatic dumping of sand at core benches

DELIVERS CORE SAND TO 9 STATIONS

FROM a simple push button control, operator of speedmuller keeps nine core makers supplied with fresh core sand at all times.

This system operates as follows — Self-dumping bucket is lowered to floor at speedmuller to receive core sand. Operator raises bucket with twin hook hoist, sets the station selector and then presses starter button. The unit runs to the proper station and stops — bucket makes complete revolution dumping sand in hopper — whereupon the unit returns to loading station. All this operation occurs automatically, with no further attention from operator.

This is just another of the many automatic systems designed by American MonoRail Engineers using the American MonoTractor. Let us tell you more about this rubber wheel drive unit. An engineer will consult with you without obligation.

THE AMERICAN MONORAIL COMPANY

13114 ATHENS AVE. ● CLEVELAND 7, OHIO

View of one section of The City Auto Stamping Company, Toledo, where EMERI-CRETE Flooring is giving maintenance-free, accident-free service.

"EMERI-CRETE

Only Floor We've Ever Found To WITHSTAND ABUSE in our plant"

After every flooring previously used in this plant broke down under the constant movement of heavy metal stampings, the Plant Engineer discovered EMERI-CRETE and made the statement quoted above.

EMERI-CRETE Flooring now resists the pounding of heavily loaded steel-wheeled trucks throughout this plant—and holds its hard, smooth, non-skid surface. Even the heavy steel stampings that are frequently *dragged* across this emery-hard flooring do not affect its rugged surface. In addition, it remains non-slip, safe for shop personnel and trucks, even though it is constantly exposed to the dripping oil of stampings in process of manufacture.

EMERI-CRETE Flooring is made with scientifically blended CORTLAND Emery Aggregate of 100% emery—second only to the diamond in hardness. It is mixed only with cement and water—and can be laid by any competent maintenance crew or contractor. It produces a flooring stronger than ordinary concrete—withstands greater loads and longer wear—provides better traction—resists most acids, sugar, oils—is less likely to crack, chip or spall.

Test EMERI-CRETE in the place in *your* plant that takes the heaviest day-after-day beating. See for yourself how EMERI-CRETE cuts floor maintenance and helps speed production.

NEW! THIS BULLETIN GIVES FACTS, LISTS USERS, SHOWS INSTALLATIONS

Send for a free copy of this new eight-page Bulletin No. 601 which tells a more complete story of EMERI-CRETE and its use. You'll find users listed, types of industry where used, actual photographs of successful installations.

893

EMERI-CRETE FLOORING

Reg. U. S. Pat. Off.

WALTER MAGUIRE CO., INC.

330 WEST 42nd STREET

NEW YORK 18 NEW YORK

in making it work, and then been baffled by irresponsible union tactics. "In retrospect," Hill says, "it is difficult to recall that the Wagner Act landed like a bombshell on the weakened structure of labor-management relations at the depth of the depression."

The CIO had not yet been born, and the AFL was not attuned to the task of organizing the unorganized. But management did not wait for the AFL to make the most of its opportunities. Management devoted much time, effort, and legal talent to the organization of collective bargaining plans many of which later fell, like ripe plums, into the net of the CIO and the AFL.

These employee representation plans gave thousands of employees their first experience in collective bargaining, and served as a testing ground for a whole generation of union leaders. However, the growth of employer-assisted employee representation plans was probably responsible for subsequent provisions in the Wagner Act against employer-dominated unions. . . .

NO BASIS FOR CONTROVERSY

However, management never has accepted the theory that there is a diversity of interests between those who direct an enterprise and those who carry out its functions. I believe it fair to say that management has adopted the principle of bargaining collectively if its employees desire to be represented by a union; but management has not and will not accept the idea that collective bargaining entails class warfare.

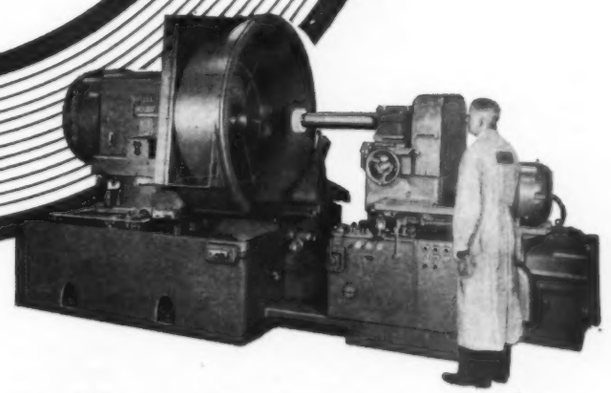
With the passage of the Wagner Act and its prohibition against management domination of, or assistance to, any labor organization, the then existing employee representation plans became hopeless orphans, and were promptly "adopted" by the AFL and the newly born and rapidly growing CIO. And even where no organization at all had existed, employees were easily persuaded that "The President of the United States wants you to join a union." The resulting union growth was phenomenal. Unionism grew far more rapidly than responsible leaders could be found to direct it into constructive channels. Management found itself squeezed between a resurgent, forced growth of unionism on the one hand, under militant, fighting leadership; and a forbidding wall on the other hand that prevented management from freely stating its views, dealing directly with its employees, or exercising many of the functions that had been traditionally and naturally within its domain.

There were other obstacles to the development of good employee relations. When employees turned to a union to

ANNOUNCING THE NEW No. 150

HYDRAULIC INTERNAL GRINDER

60" MAX. WORK DIA.



Another Bryant Postwar Development

The NEW Bryant No. 150 is a giant "internal grinder" with typical Bryant "fingertip" control. It retains the famous Bryant feature of three-point wheel slide suspension which is the basis of Bryant's reputation for high production of accurate work with fine finish.

The NEW Bryant No. 150 has a preloaded anti-friction cross slide, assuring smooth cross feed operation in spite of the size of the machine. Both hand and power cross feed are available and in addition, a hydraulic cylinder slides the wheel spindle to the rear to provide ample access for work loading or checking.

The work spindle is bored out to accommodate spindles or other long work which may be chucked conveniently by extension through the work spindle. The work spindle is designed so that chucks or fixtures may be mounted on either or both ends.

The NEW Bryant No. 150 will handle bore or bore & face grinding in a single chucking, and bores may be either straight or tapered. Write for a copy of the new catalog sheet which gives full details, capacities and dimensions.

If your internal grinding work comes within the range of 1/16 inch diameter bore up to 60" diameter swing, it will pay you to

Send for the Man from Bryant!

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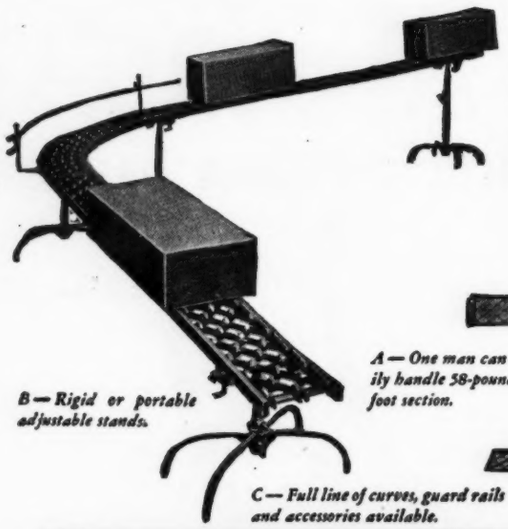
STANDARDIZED
MATERIALS HANDLING EQUIPMENT

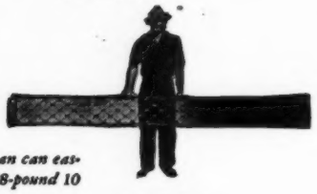
LOAD-VEYORS
SEND FOR LOAD-VEYOR MANUAL No. 1004MH

A MAGIC CARPET FOR INDUSTRY

Load-Veyors combine great strength and light weight. Exclusive Market Forge features . . . grid construction supports ball bearing rollers on both sides . . . hardened inner and outer ball bearing races minimize wear . . . Load-Veyors may be used on either side . . . rails on reverse side provide for safe conveyance of small packages.



B — Rigid or portable adjustable stands.



A — One man can easily handle 58-pound 10 foot section.

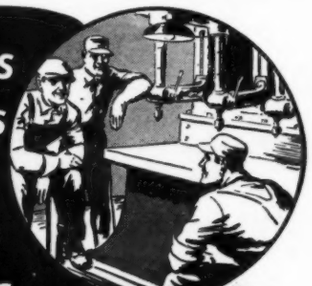
C — Full line of curves, guard rails and accessories available.

Write for name of nearest industrial distributor who stocks this equipment.

MARKET FORGE COMPANY, 82 GARVEY ST., EVERETT 49, MASS.

ARCHIE SAYS:

AVOID SHUTDOWNS DUE TO FUSE FAILURES with PIERCE *Balanced Lag* Renewable Fuses



● Pierce Fuses offer every possible safeguard: Protection against unnecessary blowing; protection against failure to blow under dangerous shorts or grounds; protection against perilous after-blow. In other words, they mean fewer shut-downs, greater safety of equipment and personnel.

The Balanced Lag of the PIERCE Fuse puts more lag within the low overload working ranges where most unnecessary blowing occurs, while maintaining even better protection at higher overloads where failure to blow is dangerous to equipment.

Superior Features Mean Super Performance

Among the outstanding exclusive features are: *Screen Ventilation* which prevents storing of heat and permits instant escape of gases; tubular *Arch-Bridge* construction for long life and easier replacement of the scientifically designed *Balanced-Lag-Link*.

FREE
SAMPLE LINK

Sent for your inspection, together with complete data on renewable fuses. Just mail the coupon.

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BUFFALO 7, N. Y.

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Please send me complete data on renewable fuses, and FREE Sample of PIERCE Balanced Lag Link as checked at right.

YOUR NAME _____

POSITION _____

COMPANY _____

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[ ] 30 Amps.
[ ] 60 Amps.
[ ] 100 Amps.
[ ] 200 Amps.
[ ] Voltage

bargain for them, some managements could not avoid a feeling of resentment. There was a feeling in some cases that the employees were ungrateful despite everything that management had done for them. The natural reaction in such cases was "if the employees want to bargain through a union, let them see what the union can do for them." It took some time for some managements to accept the union as having a proper part in the employer-employee relationship.

It is not generally recognized that today, after 10 years of the Wagner Act, management has in general accepted the theory of collective bargaining, and is willing and ready to practice it, where employees have voluntarily chosen to be represented by a union. Management has now had time to acclimate itself to the new situation and has come to the realization that, if employees wish to bargain collectively, management must either endeavor to make collective bargaining work, or risk government intervention and domination of the entire field of collective bargaining. This, in turn, means government setting of wages and working conditions, leading to a completely controlled economy. Management definitely does not want that.

TACTICS PROMOTE DISCORD

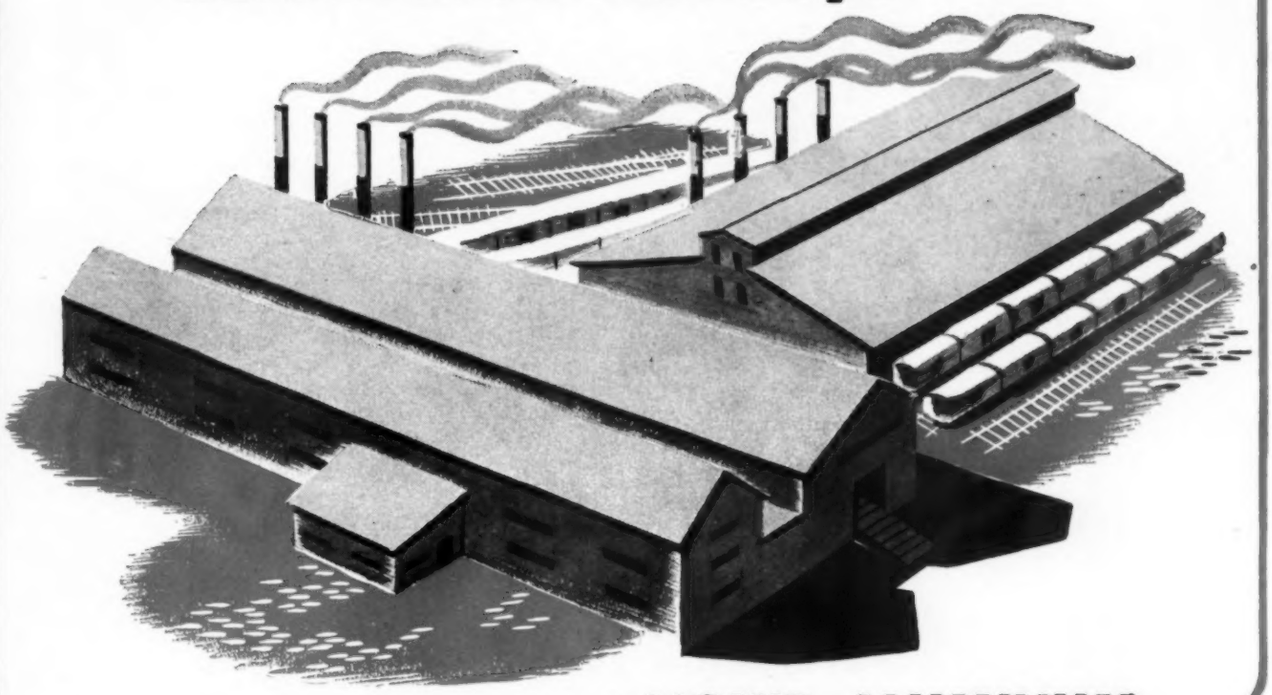
Management is, however, deeply concerned with certain union practices that interfere with collective bargaining; and it is understandably concerned with those union tactics that threaten to interfere seriously with management's functions and management personnel.

Representation disputes always interfere with orderly collective bargaining. In one plant critical war production was stopped by a strike because District 50 wanted to replace the Farm Equipment Workers as bargaining agents. The Farm Equipment union was the certified bargaining agent, and the management had no choice but to deal with that union. Nevertheless, a strike was called and production was stopped. A representation dispute not only interferes with orderly collective bargaining, but usually results in both unions trying to outdo each other, in making outrageous demands on management, in order to prove that each is the true champion of the workers.

Jurisdictional disputes do nobody any good. When two or more unions get into a dispute as to which shall have jurisdiction over specific work, the fur really flies. You will recall the long and violent jurisdictional warfare in Hollywood over which union was to collect dues from the stage designers. A similar dispute was the dockworkers strike in New York late last fall.

(*Continued on page* 274)

SHIELD your roof against destructive sun rays



. . . by coatings of LIQUID ALUMINUM

HUNGRY SUN RAYS are turned aside . . . "alligatoring" is eliminated . . . maintenance costs reduced . . . and years of useful life are added when bituminous roofs are protected with aluminum roof coatings.

When aluminum roof coatings are applied, thousands of tiny flakes of pure aluminum rise to the surface and form an overlapping shield of tough metallic armor. This protective coating reflects up to 75% of all light and heat rays . . . acts as a seal against moisture . . . reduces temperatures under the roof . . . safeguards against corrosion.

Be sure to insist on aluminum coatings of standard quality made with Reynolds *special* Roof Coat Pigments. These superior pigments are made from purest Reynolds aluminum foil stock . . . rolled . . . flaked . . . polished . . . quality-controlled throughout and backed by a quarter-century's experience.

Write for complete information. Reynolds technicians will be glad to work with you. Reynolds Metals Company, Pigment Division, 19 East 47th Street, New York 17, New York.

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REYNOLDS *points the way through* **ALUMINUM POWDERS and PASTES**

WITH

APPLETON

Reelite

TRADE MARK

PORTABLE TYPE

- *Light Right Where It's Needed*
- *Cord Reeled Up, Out of the Way*

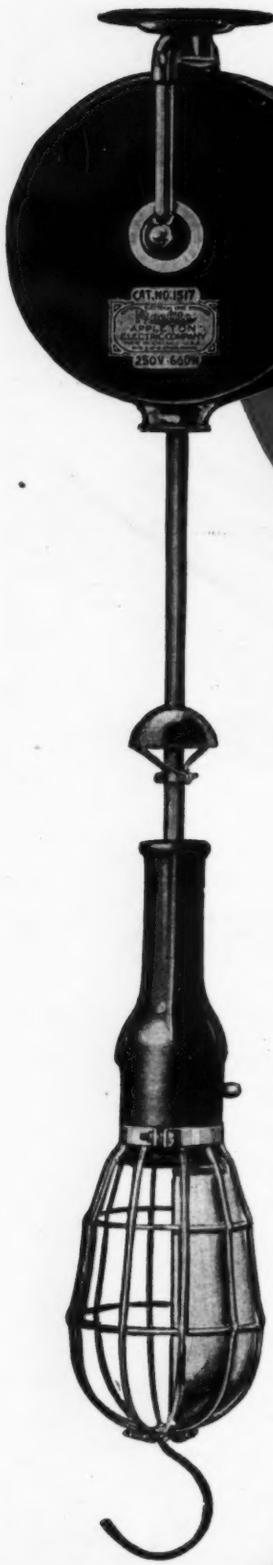
Eliminate Accidents—to light conductor cable and to personnel—with Appleton Reelites. No chance for cord to kink, tangle, or break because excess is kept reeled out of the way, yet light is instantly available where needed.

Speed Up Production—Each Appleton Portable Reelite works on a ratchet stop so that cords are held at any length without tension. Convenience and ease of handling reduce time and fatigue—speed up production.

Cut Maintenance Costs—The rugged, sturdy construction of Appleton Reelites provides a lifetime of trouble-free reeling and hard usage—cuts cord costs to a minimum.

SEND TODAY

for this 50-page, illustrated Bulletin 504 on Appleton Reelites. Contains complete information on Constant Duty Types, as well as Portable. Also special Reels for air and fluid lines. Or, see Sweet's File, Page 2a/19.



Levolier socket with or without switch in handle. Heavy wire guard takes 40 to 75 watt lamps.

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It is difficult for management to understand how the Wagner Act can permit such actions as these. Yet the Act specifically makes strikes over these things legal.

It is certainly no service to collective bargaining to use the union's strength, even to calling a strike, for political purposes. I need hardly remind you of the example of that, which Michael Quill demonstrated so recently. Quill threatened to call a strike of his Transport Workers Union on 48 hours' notice, unless he was given assurance that certain power generating facilities of the City of New York would not be sold to a privately owned public utility.

STRIKES VIOLATE AGREEMENT

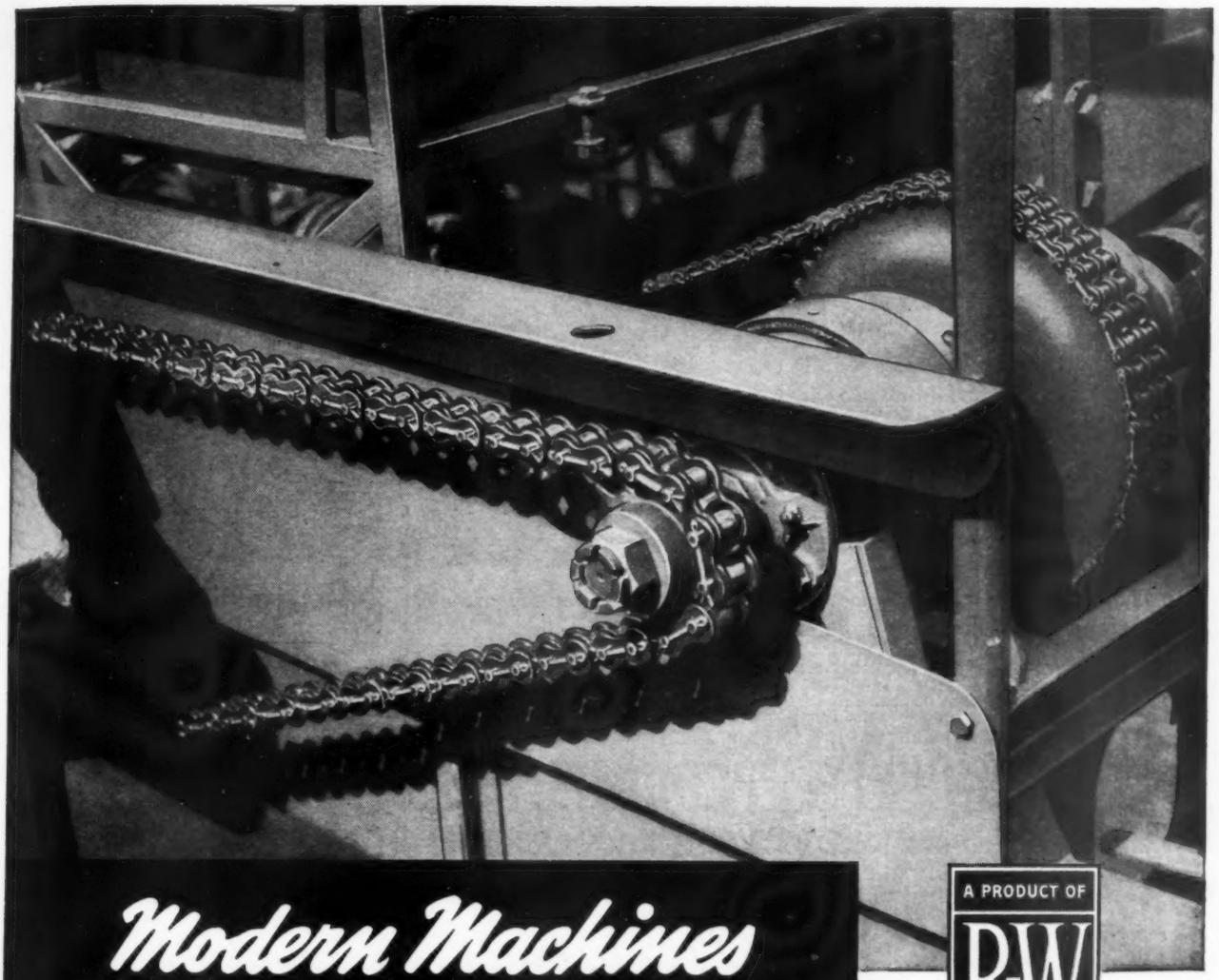
Perhaps the most destructive type of strike, from the viewpoint of those who would like to make collective bargaining work, is the strike in violation of a collective bargaining agreement. At the very time that the President's Labor-Management Conference was meeting in Washington, the streetcar and bus operators struck, paralyzing all transportation except cabs and automobiles in the nation's capital. The strike was called without notice, and took place despite the fact that there was a no-strike clause in the agreement then in effect, and despite the fact that the management offered to arbitrate as provided in the agreement. In that case the management might well ask: "What is the use of bargaining collectively?"

Another type of strike which is entirely intolerable is the strike designed to force the employer to violate the law.

To management, examples such as these indicate how unequal is the Wagner Act in its application to the two parties at the bargaining table.

Finally, management feels that it could participate much more effectively in collective bargaining if it knew that collective bargaining could not be used as a device to transfer management functions to the union. The Wagner Act is not clear on this point. Management cannot avoid approaching collective bargaining warily so long as the unions demand the right to participate in the determination of selling prices, the amount of production to be scheduled, profits, the amount to be set aside for research or reserves, etc. If the entire area of management functions were taken out of the scope of legally required collective bargaining, management would be less guarded in its approach to union negotiations.

Despite my preference for voluntary methods, my participation at the President's Labor-Management Conference has convinced me that our only hope for correcting the unbalanced situation



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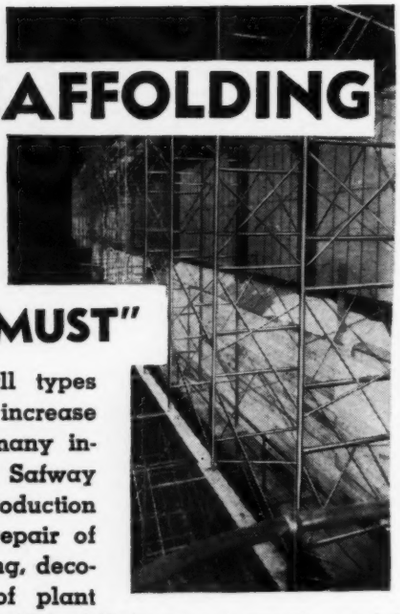

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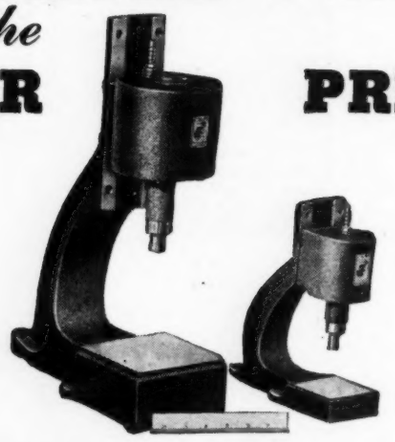

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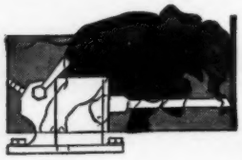

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created by the Wagner Act and its administration, and establishing a basis for making collective bargaining work in the public interest, is to pass appropriate legislation.

While organized labor will strenuously object to such legislation as sounding the death-knell of organized labor, once such legislation becomes enacted, understood, and accepted, labor will find it a help rather than a handicap in its continued growth. Such legislation will help organized labor become a respected member of the community. Even more important, national labor leaders will find it easier to control unruly elements, and true collective bargaining will become an instrument for promoting the public interest.

Labor Standards Act Hits Industrial South

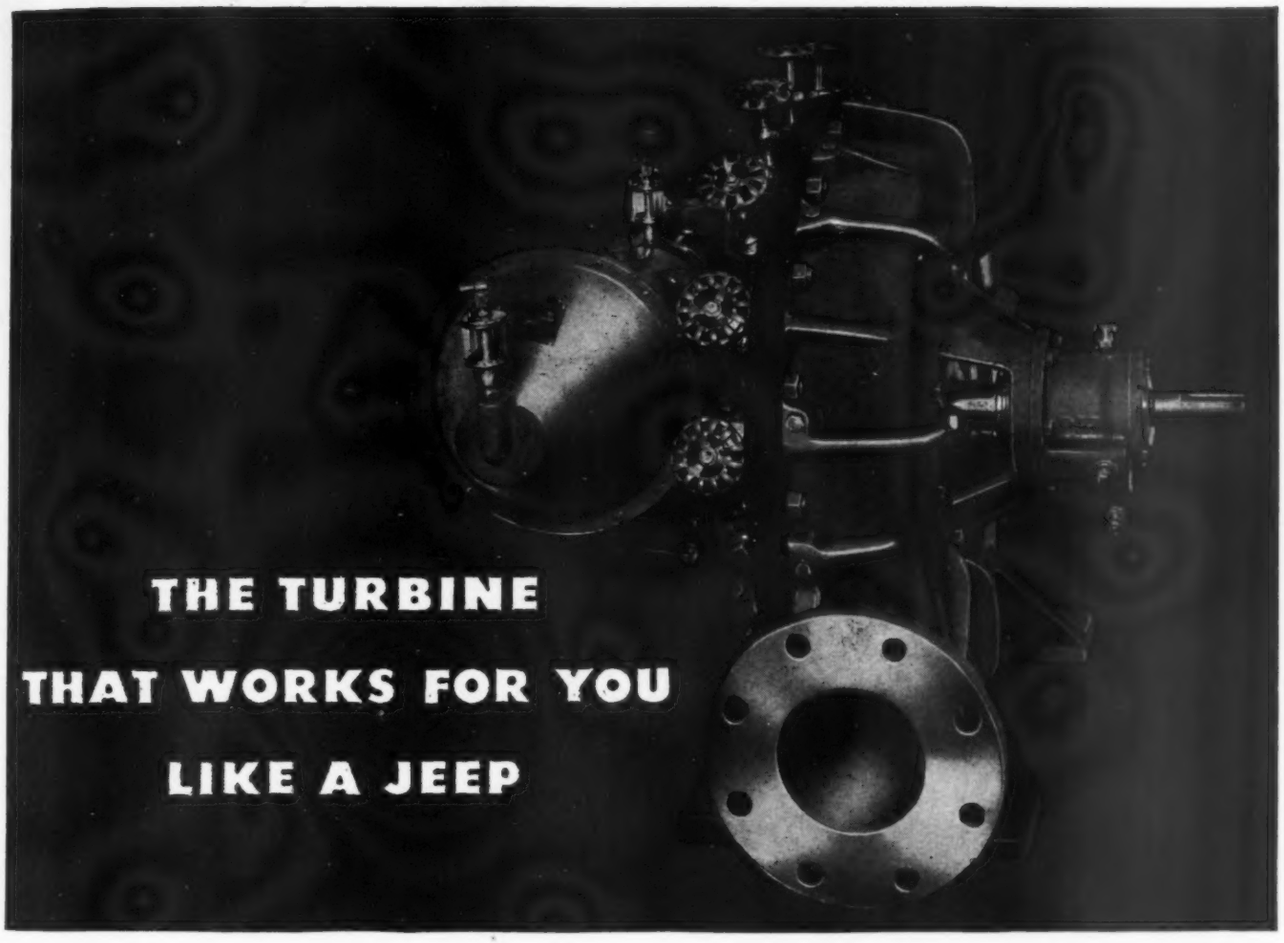
JOHN V. VAN SICKLE, Professor of Economics, Vanderbilt University, writing in the *Harvard Business Review*

Pointing out that a minimum wage law affects primarily southern industry, which cannot meet the 65- to 75-cent standard proposed, Van Sickle urges abandoning the conception of uniform minimums throughout the country.

He proposes that minimum wages should be adjusted to the economic characteristics of the varying geographical regions. "A minimum should be set in each region beginning with the most rural communities and at such a level as not to cause any substantial unemployment; and then step-ups by size of community should be recognized."

Until the passage of the Fair Labor Standards Act the prospects for the South were bright, says Van Sickle. Industrialization had been going on at a reasonably satisfactory rate for several decades. This development occurred because the federal government, and organized groups generally, allowed economic forces to operate without serious interferences. The South was able to overcome the handicap of mediocre soils, scant local capital, thin local markets for industrial products, and lack of skilled labor and managerial talents through its abundance of willing and trainable unskilled labor.

"New England can testify to the fact that this development of the South has been hard to take. It is not surprising, therefore, that public opinion outside the South came to the conclusion that the rate of growth in the South was forcing adjustment in the more industrialized parts of the country at too rapid a rate. The imposition of a nation-wide minimum wage applicable to southern industries competing in national markets



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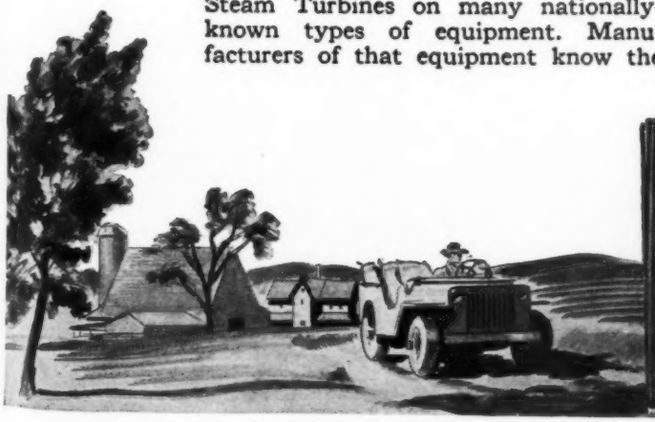
Write for Bulletin 135–10. Coppus Engineering Corporation, 325 Park Avenue, Worcester 2, Mass. Sales offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" products in SWEET'S.



ANOTHER
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"BLUE RIBBON" PRODUCT

9 out of 10 men freed from soldering iron servicing after changeover to Stanley Armor Clad Tips

Photo Courtesy The F. W. Sickles Company

A radio parts manufacturer, employing over 3000 people, used to keep ten men jumping from soldering iron to soldering iron . . . reconditioning and replacing tips. Four years ago he fitted all his irons with Stanley Armor Clad Tips . . . and found that he needed only one man to keep all their irons in top condition. And since Armor Clad Tips outlast ordinary copper tips three to ten times, he's saving a lot of money on replacements.

The protective sheath bonded to the copper tips does not permit oxidation or corrosion. Even ordinary wear is reduced because this armoring is more resistant to friction than plain copper tips. Easily retinned. Available in a wide variety of sizes and tip shapes for Stanley and other standard makes of soldering irons. Ask your distributor for a demonstration. Write for descriptive, illustrated folder. Stanley Tools, New Britain, Conn.

STANLEY

STANLEY TOOLS

was urged as a means of slowing down the South's industrialization.

Van Sickle goes on to show how the increasing industrialization of the South was halted by the operation of the Fair Labor Standards Act. He cites the experience of the seamless hosiery, cottonseed, and lumber industries. In the light of this evidence he attacks the proposed amendments to the Fair Labor Standards Act now before the two Houses of Congress. "Can the South's industries provide the needed employment if a 65- to 75-cent minimum is imposed upon them? The answer is clearly 'no.'"

Most of the industries in the southern states, Van Sickle goes on, "cannot possibly absorb any such wage increases at prevailing prices. And until the output of the low-wage plants declines, there will be no force making for a rise in product prices. The plants in the big cities in the highly industrialized parts of the country will be little, if any, affected; competitive conditions have already imposed the 65-cent minimum on them. Hence most plants in the South, as well as many smaller concerns in the more rural parts of the industrialized North, will be obliged to reduce their present scale of operations or close down entirely." The author contends therefore that "for the long-run advantage, not only of the South but also of the country as a whole, the principle of a uniform minimum wage should be abandoned."

Behind the Byline

Facts About FACTORY's Authors

A consultant specializing in training group leaders, Alfred R. Lateiner (*Selling Safety to Supervisors Cuts Accidents 67 Percent*, page 102) is 35, married, and very proud of a two-year-old son. A 25-year resident of New Rochelle, N. Y., Lateiner studied at the University of North Carolina and New York University, spent three years in building construction and three years as a sales engineer. He got into training during the national defense program when he was an instructor in the New York State program, later developed a course for supervisors for the Navy that was adopted as a Navy standard, won Lateiner the Meritorious Award.

(CONTINUED ON PAGE 280)

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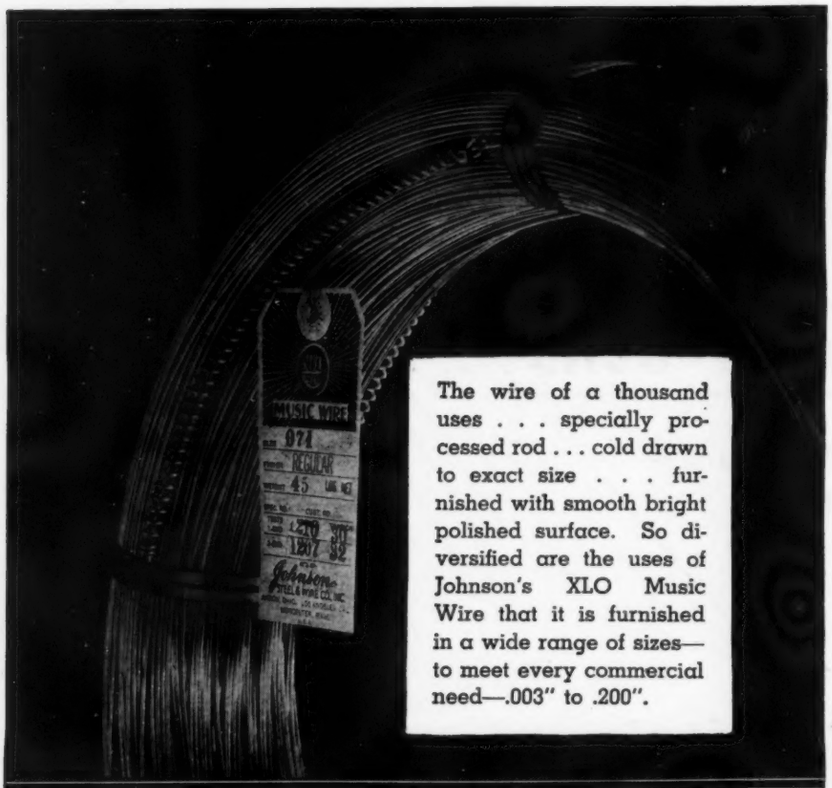

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A Chicagoan with 12 years' experience with the Union Special Machine Company, J. R. Haugan, (*Shadowless Lighting*, page 105) is a graduate of Central YMCA College and Lewis Institute, member of the Western Society of Engineers, and makes canoeing and fishing in the Canadian North Woods his hobby. During the war he designed an electric infra-red batch-type oven which speeded production of Norden bombsight parts.

In his spare time an enthusiastic radio amateur, operating his own station W3HXU, and a horticulturist with a 16-acre farm at Bangor, Pa., Lewis J. Marcon (*Work-Savers That Add Up to Low-Cost Production*, page 113) is methods engineer in the industrial engineering department of Philco Corporation. His formal education includes electrical and radio engineering courses at Syracuse University and Penn State, engineering and management courses at the University of Pennsylvania and Temple University. Today he is concerned in solving industrial engineering problems in civilian radio production.

Head of the recently formed labor relations department of Caterpillar Tractor Company, George W. Torrence (*Union - Company Chart Solves GI Seniority*, page 140) has specialized in union relations, arbitration, collective bargaining, governmental labor agency contacts, and labor relations investigation since 1937. He joined Caterpillar in July, 1936, in the college graduate training program, and transferred shortly afterwards to the industrial relations department, of which the new labor relations department is an offshoot. A native of Yankton, S. D., Torrence is a graduate of Stanford, majoring in economics.

(CONTINUED ON PAGE 282)

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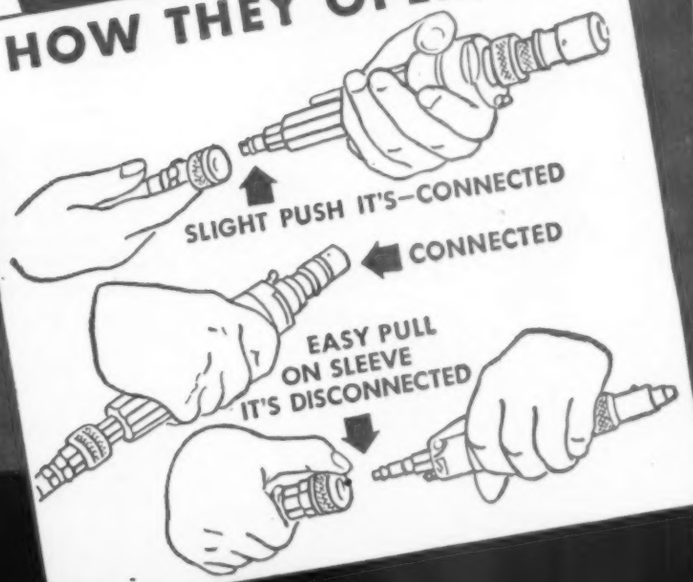

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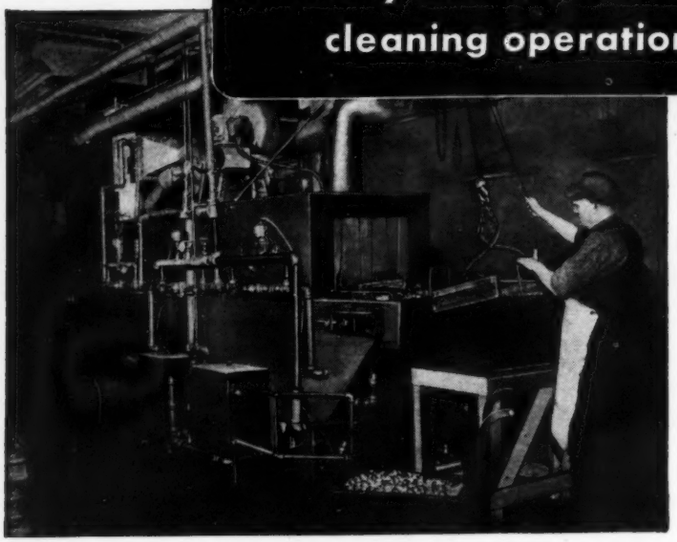

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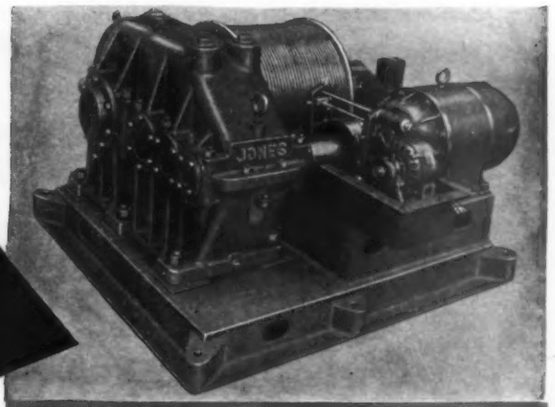
Another "ham" radio operator and a rifle shot good enough to participate in regional and national matches before the war, A. W. McAuly (*Orderly Storage of Spare Parts Cuts Production Delays*, page 142) has, as he says, "tangled with a wide variety of jobs." As superintendent of the electrical department of Edgewater Steel Company, he enjoys himself "more every day" handling problems ranging from installation of rolling mill drives to dial telephones. McAuly missed college, but has studied everything he could lay his hands on, from elementary physics to psychology —and is still at it.

In four years with the Wyman Gordon Company, five years with H. J. Heinz Company in Pittsburgh, Pa., and while in college and in spare time service with the Chicago and Pittsburgh YMCA's, Richard B. Cribbs (*Aiming Millwright Training at Low-Cost Production*, page 146) has been actively directing groups of people. He majored in group education work at Duquesne University and George William's College. His hobbies include golf, tennis, bowling, handball, music, and writing. He has contributed several articles to magazines specializing in personnel work and industrial training.

Member of a Philadelphia engineering firm, N. N. Barish (*One-Card Graphic System for Close Control of Materials*, page 149) has been an industrial engineering supervisor for Radio Corporation of America, an economic and business analyst for the government, and office manager for a fur dyeing firm. He holds a B.S. from the University of Michigan and an M.S. from the University of Pennsylvania. For recreation, he skis, swims, rides, plays tennis, and collects records—with violin concertos and chamber music rating slightly higher than boogie-woogie and the classics.

When the drive is built into the unit



● Jones Skip Hoist Drive built as a complete unit by the Jones organization in several types with base to take any motor specified by the purchaser. This drive is equipped with all the modern protective devices such as cam or nut type limit switches, solenoid or disc type brakes and slack cable switches. The drives are single, double or triple reduction Jones Herringbone Speed Reducers.

FOR many years the Jones organization has been developing various types of drive units in which Jones special or standard speed reducers form an important integral part of the unit.

The car puller, door hoist and skip hoist drives illustrated and described here are typical specimens of Jones Unit Drives. These machines are built as complete units by the Jones organization with base to take any motor specified by the purchaser.

The Jones organization has also worked with a great many manufacturers in the application of Jones gears and speed reducers to an extremely wide variety of complete assemblies. You are invited to make full use of this experience in connection with any power transmission problems that you may have.

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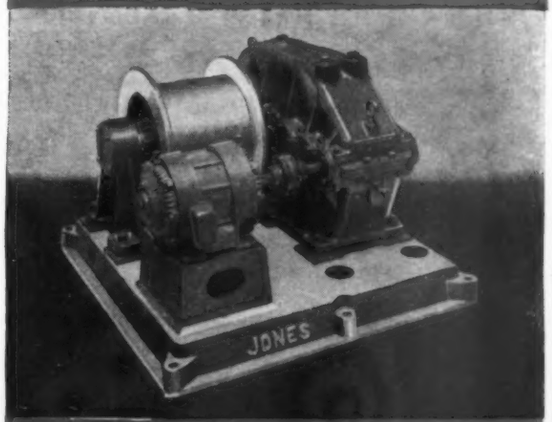
● Jones door hoists are built in many ratings and may be installed with almost any convenient arrangement of sheaves and cables. Base will take any standard motor. No limit switches of any kind are required with this unit.



● A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.

Jones

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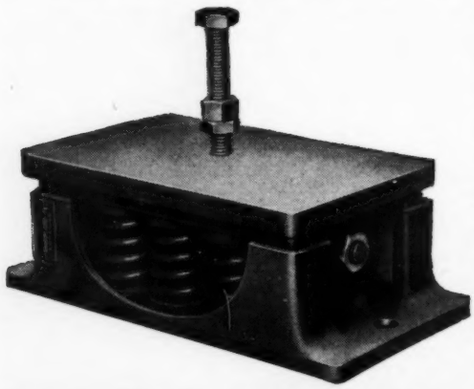

Korfund Type LK Vibro-Isolator shown at left is of steel spring construction with resilient chocks at the corners as stabilizers. These inserts can be adjusted to the correct amount of damping for the individual installation.

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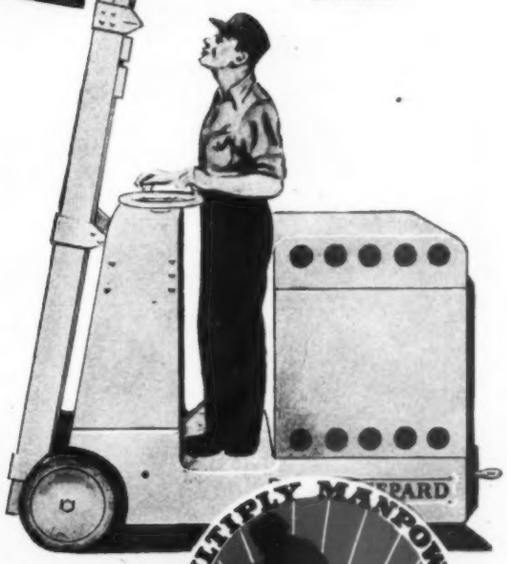

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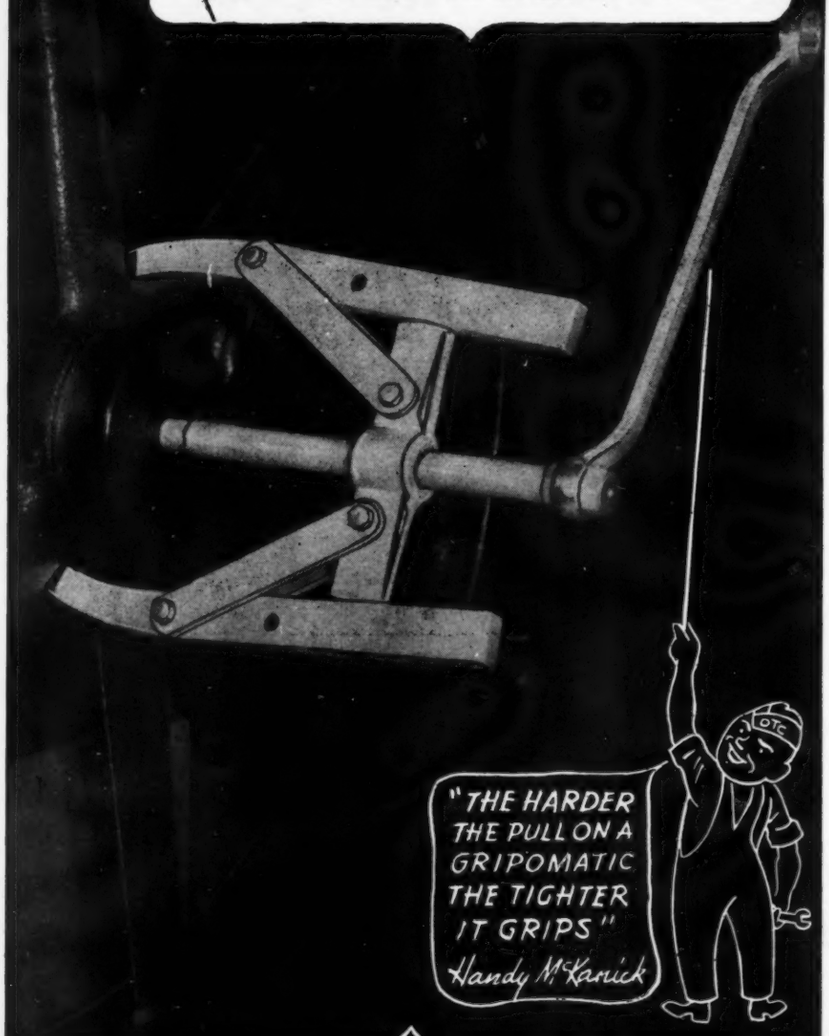

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Wilbert E. Moore. The Macmillan Co., 60 Fifth Ave., New York. 555 pages. Charts, tables, authors and subject indexes. $4.

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John M. Amiss and Esther Sherman, Whittlesey House, McGraw-Hill Book Company, 330 West 42nd St., New York 18. 227 pages. Illustrated by drawings. $2.50.

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Bethel J. McGrath, R.N. The Commonwealth Fund, 41 East 57th St., New York. 356 pages. Photographs, sketches, charts, sample forms, appendix, index. $3.

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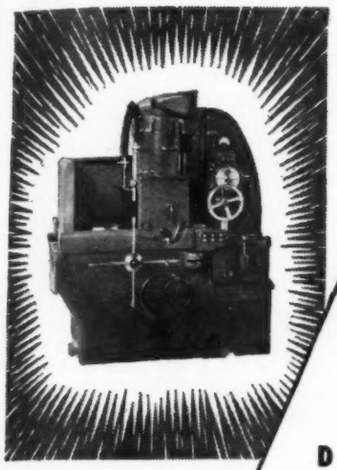

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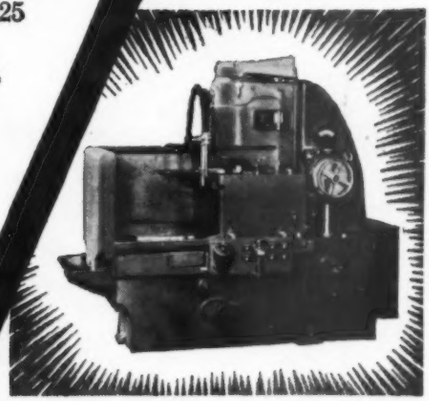

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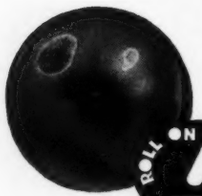

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PROCEEDINGS OF THE NATIONAL TIME AND MOTION STUDY CLINIC. Research Division of the Industrial Management Society, 176 W. Adams Street, Chicago 3. 96 pages. Photographs, forms, charts, graphs. $1.50.

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WORLD OIL—FACT AND POLICY. Subtitled, "The Case For a Sound American Petroleum Policy." The Petroleum Industry Research Foundation, Inc., 122 East 42nd St., New York, 17. 80 pages. Sketches, charts, graphs. 75c.

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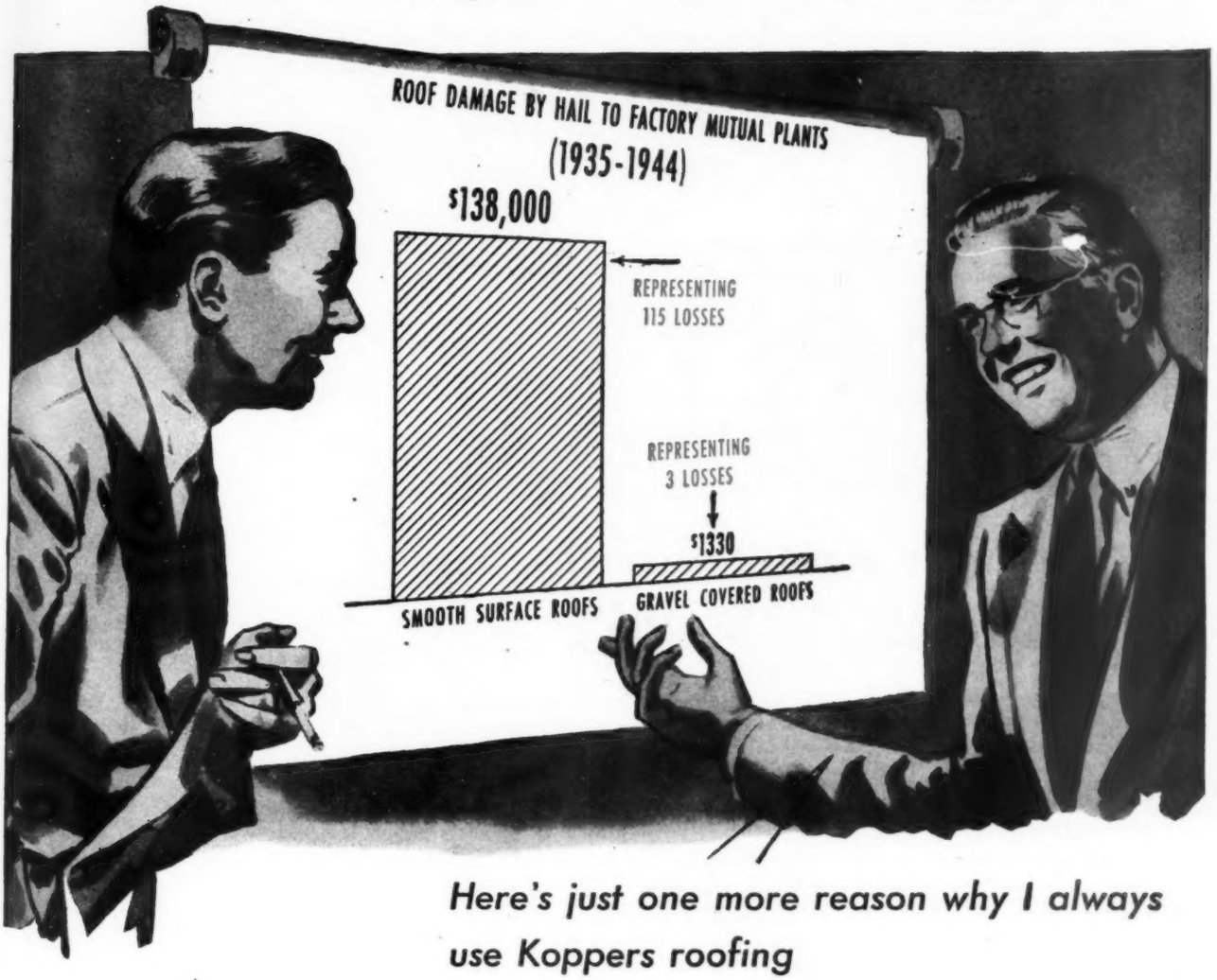

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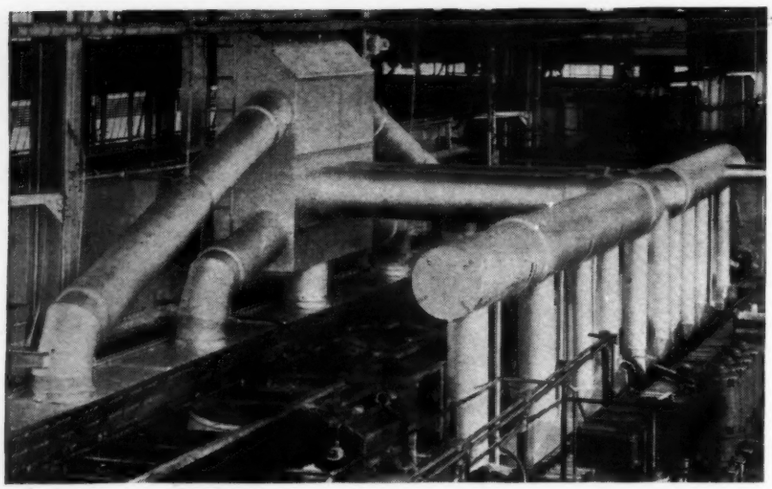

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MAY

6–10, American Foundrymen's Association, 50th Anniversary Golden Jubilee Convention and Foundry Congress. Cleveland Auditorium, Cleveland. William W. Maloney, Secretary, 222 West Adams St., Chicago.

7–9, National Association of Corrosion Engineers. Annual Meeting and Convention. President Hotel, Kansas City. Elton Sterrett, Executive Secretary,

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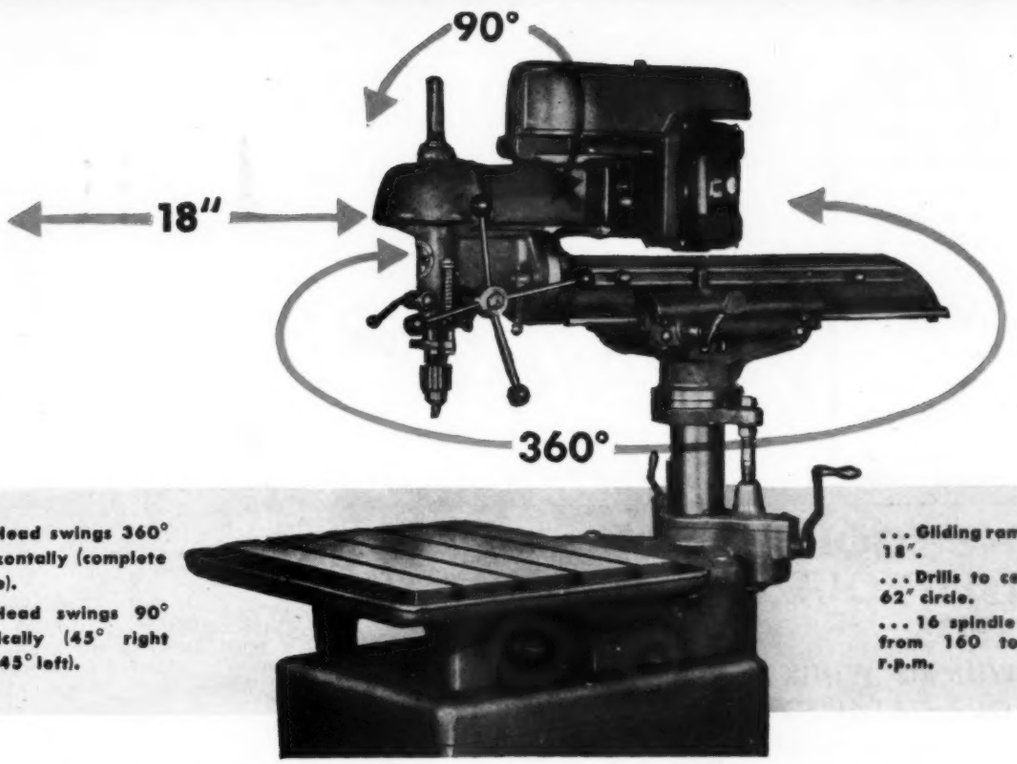

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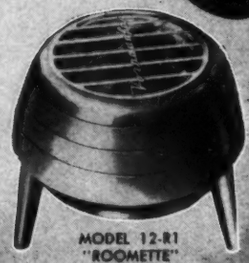

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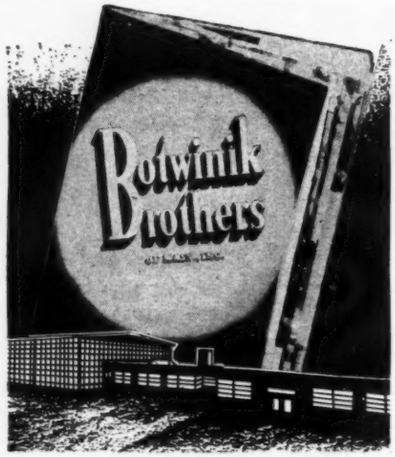

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10–11, The National Council of Industrial Editors, National Convention, Hotel Statler, Boston. William C. Gentry, Chairman, Convention Committee, The Pilot's Log, New England Mutual Life Insurance Company, Boston.

27–29, National Association of Purchasing Agents, Annual Convention, Stevens Hotel, Chicago. G. A. Renard, Executive Secretary-Treasurer, 9 Park Place, New York 7.

JUNE

2–5, American Society of Refrigerating Engineers, Spring Meeting, St. Paul Hotel, St. Paul, Minn. A. B. Stickney, President, 50 West 40th St., New York.

3–7, National Fire Protection Association, 50th Annual Convention, Hotel Statler, Boston. Percy Bugbee, General Manager, 60 Batterymarch St., Boston 10.

6–7, American Management Association, General Management Conference, Hotel Pennsylvania, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

17–19, National Association of Cost Accountants, Annual Meeting, Waldorf-Astoria, New York. W. P. Fiske, Secretary, 385 Madison Ave., New York.

17-19, American Society of Heating and Ventilating Engineers, Semi-Annual Meeting, Montreal. A. V. Hutchinson, Secretary, 51 Madison Ave., New York.

17–20, American Society of Mechanical Engineers, Semi-Annual Meeting, Hotel Statler, Detroit. Ernest Hartford, Executive Assistant Secretary, 29 West 39th St., New York.

20–23, Society for the Promotion of Engineering Education, Annual Convention, Jefferson Hotel, St. Louis. Dr. S. L. Bishop, Convention Secretary, Illinois Institute of Technology, Chicago 16.

24–28, American Institute of Electrical Engineers, Summer Convention, Statler Hotel, Detroit. H. H. Henline, Secretary, 33 West 39th St., New York.

24–28, American Society for Testing Materials, 49th Annual Meeting, Statler Hotel, Buffalo. C. L. Warwick, Executive Secretary, 260 South Broad St., Philadelphia.

JULY

24–27, Silver Bay Conference on Industrial Relations, 28th Annual Conference, Silver Bay-on-Lake George, N. Y. William F. Meyer, Jr., Secretary for Industrial Services, 347 Madison Ave., New York.

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